

SERVICE MANUAL

BioChemGARD®

Class II, Type B2 Biosafety Cabinet



MODELS:

BCG401, BCG601, BCG401-AUS, BCG601-AUS, BCG401-INT, BCG601-INT

This manual includes information for proper operation of this cabinet.
We recommend that it be kept near the cabinet for ready reference.

INTRODUCTION AND WELCOME

Welcome to Baker

Thank you for choosing to join the growing number of people who are achieving excellence in science and clinical care through clean air, containment, and incubation solutions from Baker. As a fixture in laboratories and clinical settings around the world, Baker takes special pride in helping people just like you to create optimal environments for their work, while providing a safe and comfortable user experience.

At Baker, nothing is more important to us than the trust you place in our solutions to help you achieve your goals. Whether you are involved with basic scientific research, drug discovery, or patient care, Baker has a proven record of delivering high-performing equipment through an uncompromising commitment to safety, testing, quality, and craftsmanship. Additionally, as a Maine-based family owned business in operation for more than 60 years, you can rest assured that Baker will be there for you throughout the life cycle of your new equipment.

Baker is a pioneer in the field of biological safety, and our reputation is built on taking no shortcuts and making no compromises when it comes to user safety. We are the only manufacturer to routinely subject our own equipment to extensive microbiological aerosol testing in the most challenging conditions – above and beyond what the average user would ever encounter. However, the adequacy of any equipment for user safety in a specific application should always be evaluated. This risk assessment should be performed by an industrial hygienist, safety officer, or other qualified person representing the purchasing organization. Remember that you, the owner and user, are ultimately responsible and that you use this equipment at your own risk.

I recommend that you keep a copy of this manual, along with the factory test report (if applicable), near your new equipment for convenient reference by operators and qualified maintenance personnel. If you have any questions about the use or care of your Baker equipment, please do not hesitate to contact our Technical Service Department for assistance at (800) 992-2537 (+1 207 324-8773 outside the United States) or techsupport@bakerco.com.

Thank you for placing your trust in Baker.

Sincerely,

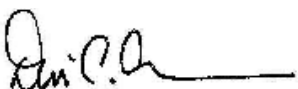
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Specifications

Exterior Dimensions

	BCG401	BCG601
Foot Print (width X depth)	53 ⁷ / ₈ x 33 ⁵ / ₈ " [1,369 x 854 mm]	77 ⁷ / ₈ x 33 ⁵ / ₈ " [1,978 x 854 mm]
Foot Print incl. low static duct (w x d)	53 ⁷ / ₈ x 42 ¹ / ₂ " [1,369 x 1,081 mm]	77 ⁷ / ₈ x 42 ¹ / ₂ " [1,978 x 1,081 mm]
Min Height	86" [2,184 mm]	
Max Height	94 ¹ / ₂ " [2,400 mm]	
Shipping Height (exhaust collar & leg levelers removed)	77 ³ / ₁₆ " [1,960 mm]	
Shipping Height (leg levelers removed)	78 ⁷ / ₈ " [2,004 mm]	

Unit Weights

Base Unit weights (no options)	BCG401	BCG601
Unit weight	720 lbs. [327 kg]	850 lbs. [386 kg]
Unit weight including low static duct	740 lbs. [336 kg]	900 lbs. [409 kg]
Unit shipping weight	850 lbs. [386 kg]	1,020 lbs. [463 kg]
Unit shipping weight incl. low static duct	870 lbs. [395 kg]	1,070 lbs. [486 kg]

Plumbing Service

Standard laboratory air, vacuum, gas and water service connections are rated for 30 psig [308 kPa] maximum pressure and connections are provided by 3/8" OD Brass Tube fitting connectors.

Electrical Service

A single 20 A dedicated circuit is required to power this cabinet. This circuit shall provide the protective earth ground for the cabinet.

All electrical wiring to the cabinet should comply with the National Electrical Code and any applicable local electrical codes at the site of installation.

The power cord is the main disconnect device for the unit. The unit should be positioned in a manner that allows easy access to the power cord connection with the electrical utility.

The cabinet is provided with work area lighting.

The cabinet may be provided with an optional UV lamp.

The cabinet may be provided with an optional 24V DC power supply for low voltage options.

The cabinet's operating current (less outlets and options) is listed in the accompanying test report.

Service Requirements	
100V $\pm$ 10%V AC	100 V AC, 20 A, 50/60 Hz, 1Ø 16 A maximum useable current
115V $\pm$ 10%V AC	115 V AC, 20 A, 60 Hz, 1Ø 16 A maximum useable current
220V $\pm$ 10%V AC	220 V AC, 16 A, 50/60 Hz, 1Ø 13 A maximum useable current
Circuit Protection	
100/115 V AC	Internally protected with a 250 V, 20 A circuit breaker
220 V AC	Internally protected with a 250 V, 16 A circuit breaker

Power Cord	
100 V AC	One 14' [4.27 M] power cord with 20A plug, NEMA 5-20P
115 V AC	One 14' [4.27 M] power cord with 20A plug, NEMA 5-20P
220 V AC	One 4 M power cord with listed plug for the destination country
Outlets	
100 V AC	Two 115 V AC, Duplex outlets. The outlets on this circuit are protected by a self-resetting circuit breaker allowing for a total of 7A on all outlets.
115 V AC	Two GFCI protected, 115 V AC, Duplex outlets. The outlets on this circuit are protected by a self-resetting circuit breaker allowing for a total of 7A on all outlets.
220 V AC	Two 220 V AC, outlets. The outlets on this circuit are protected by self-resetting circuit breakers allowing for a total of 7A on all outlets

Exhaust Flow Specifications

NSF Concurrent Balance Value: NSF/ANSI 49- 2010a

3.10 Concurrent Balance Value: This value is determined using the duct traverse measurement method as specified in ASHRAE Standard 111-2008, a minimum of 7.5 duct diameters downstream of a direct connected Biological Safety Cabinet (BSC). Prior to determining the concurrent balance value, it shall be confirmed that the cabinet is operating at its nominal set points for inflow and downflow velocity ± 3 fpm [0.014 m/s]. The primary Direct Instrument Measurement (DIM) method shall be used for setting the inflow velocity. The accuracy of the DIM shall be better than or equal to $\pm 3\%$ and ± 7 CFM [3.3 l/s]. The static pressure is also measured approximately two duct diameters from the cabinet exhaust connection. Appropriate filter load and tolerance values shall be added to the base static pressure value to accommodate filter loading: 0.3"W.G. [75 Pa] shall be added for Type B1 cabinets and 0.7"W.G. [174 Pa] shall be added for Type B2 cabinets. The resulting values may be used for design and balance exhaust/supply HVAC requirements.

8"[203MM] Access Opening Model	CBV Required Exhaust Volume CFM[L/SEC]	CBV Required Exhaust Duct Static Pressure "W.C. [PA]		
		8"[203MM] Diameter Duct	10"[254MM] Diameter Duct	12"[305MM] Diameter Duct
BCG401	664 CFM [313 L/SEC]	-1.9 "W.C. [-473 PA]	-1.7 "W.C. [-423 PA]	-1.6 "W.C. [-399 PA]
BCG401 w/ low static duct	664 CFM [313 L/SEC]	-1.7"W.C. [-423 PA]	-1.5 "W.C. [-374 PA]	-1.4 "W.C. [-349 PA]
BCG601	993 CFM [469 L/SEC]	-2.3 "W.C. [-573 PA]	-1.8 "W.C. [-448 PA]	-1.7 "W.C. [-423 PA]
BCG601 w/low static duct	993 CFM [469 L/SEC]	-2.0 "W.C. [-498 PA]	-1.6 "W.C. [-399 PA]	-1.5 "W.C. [-374 PA]

NOTE: the exhaust static pressure values in above table INCLUDE the appropriate filter load values as required by NSF

CBV=Concurrent Balance Value
CFM= Cubic Feet per Minute
L/SEC= Liters per Second
PA= Pascal
MM= Millimeter
"W.C. = Inches of Water Column

Environmental Specifications

The cabinet is designed for use in the following conditions:

- Indoors
- Altitudes up to 2000 meters
- Temperature range from 5 °C to 40 °C
- Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% at 40°C
- Main supply voltage 115V $\pm$ 10%V AC
- Transient over voltage according to Installation Category (OVERVOLTAGE CATEGORIES) II per UL 61010-1, 2nd Edition
- Pollution Degree 2

Symbols and Terminology



Protective Earth: Any terminal intended for connection to external protective conductor for protection against electric shock in case of a fault.



General Caution: Refer to instruction manual for information regarding personnel and environment protection.



**WARNING: Cancer
and Reproductive Harm -
www.P65Warnings.ca.gov**

Installation

Preparing the BCG for use

Checking the cabinet upon arrival

Checking the Cabinet Upon Arrival

Upon receipt of a new BioChemGARD e3 cabinet, inspect the exterior of the crate, box and/or skid. If there is any visible damage, that fact should be noted on the receiving slip and immediately reported to the delivering carrier.

Remove the outer packing material and inspect the cabinet itself. If any concealed damage is found it should be reported to the delivery carrier. **A claim for restitution should be filed within 15 days.**

Due to the risk of mishandling by trucking companies, Baker has removed certain parts of the cabinet and has packed them separately. These items are listed on the packing slip, which accompanies the cabinet. Please check the packing slip carefully to be sure that all items have been located.

Preparing the cabinet for installation

Installation of this cabinet should be carried out in accordance with appropriate OSHA regulations and those other regulatory agencies having jurisdiction.

To insure operator safety the cabinet must be installed and operated per the manufacturer's instructions.

1. Remove the strapping that holds the cabinet to the pallet.
2. Remove the cabinet from the skid with a forklift or other available equipment.
3. Move the cabinet into the laboratory room. Remove all tape, plastic wrap and other packaging materials on the cabinet.

4. The viewscreen counterweight is located in the rear right of the cabinet. Remove two 1/4-20 hex head shipping screws that hold the viewscreen counterweight from moving. Verify that the viewscreen moves freely.
5. Change out shipping hardware with 1/4-20 thumb screws provided. A drawing is provided showing the location of the shipping hardware on the cabinet.
6. The adjustable leg levelers for the stand are shipped with the unit in a small cardboard box.
7. Follow the stand adjustment instructions on page **Error! Bookmark not defined.** to set the cabinet to the desired worksurface height.
8. Position the cabinet in its desired location within the laboratory room. Remove the front stand shipping brace. **Do not remove the rear stand bracing.**

Location within the laboratory

Proper placement within the laboratory is essential. The ideal location for any biological safety cabinet is in a dead-end corner of the laboratory away from personnel traffic, vents, doors, windows and any other sources of disruptive air currents. Published research from The Baker Company and unpublished tests performed at the National Cancer Institute show that if a draft or other disruptive air current were to exceed the intake velocity of the cabinet, contamination can enter the work area or escape from it. If additional information is required, contact The Baker Company.

Venting outside the facility

The BioChemGARD e3 cabinet operates with dedicated filtered exhaust ducted to the outdoors. Whenever possible, the cabinet exhaust should be connected to its **own** separate exhaust system. If it must be ducted into a ganged exhaust system, make sure that the system is not a recirculating one. The cabinet has a low Air Flow Alarm (AFM) that provides audible and visual indication if the cabinet's exhaust volume drops to 20% below the exhaust setpoint. The building exhaust system should contain provisions to adjust the building system flow and pressure. The connection between the cabinet and the building exhaust duct is a 12" [305 mm] nominal diameter Hard Exhaust Connection (HEC).

Final connections and test

1. The plumbing connection to the service petcocks must be made with great care

because the effluent from a safety cabinet may be biologically hazardous. The facility safety officer should be consulted regarding these connections to assure they are properly connected and filtered if required. When present, petcocks are piped within the cabinet. The external connection uses 3/8" compression fitting at the rear, top or bottom of the cabinet outer sidewall seal panel. Qualified personnel with proper materials and technique should make connection to plant utilities per NFPA.

Flammable gas should not be piped into any cabinet.

2. A power cord with a listed plug appropriate to the destination country is furnished with the cabinet. It should be plugged into a dedicated utility outlet.
3. Thoroughly clean the interior of the cabinet. Locate the viewscreen at the certified work access opening height indicated by red marker arrows on both the right and left viewscreen guide.

NOTE: See Section III - PROPER CABINET USE "Operator Controls" for information regarding steps 4, 5, & 6 below.

4. Turn on the blower. The indicator light will illuminate and the running blower will make a soft audible sound.

NOTE: Building exhaust system airflow must be at a safe level for cabinet blower to operate.

5. Turn on the work Area light. The indicator light will illuminate along with the interior work area.

NOTE: The work area light will not operate unless the blower switch is on. The work area light will not operate when the viewscreen is closed.

6. If your cabinet has been purchased with the optional ultraviolet light (UV), lower the viewscreen to its fully closed position and turn the UV light on to make sure it is operational.

NOTE: The UV light option features an interlock that prohibits its operation unless the viewscreen is fully closed.

7. Although all units are carefully tested at the factory, it is advisable that certain other checks are made on-site by a qualified technician after installation. These include testing the filters for leaks and checking the air balance of the cabinet. A description of these tests can be found in **Section IV - ONSITE CHECKS AND MAINTENANCE PROCEDURES.**

8. It is recommended that all personnel who will be using the cabinet study this manual to

learn how to use it effectively. For additional start up and use procedures, reference **BCG Operators manual**.

FOR MORE INFORMATION

For a complete listing of articles, papers and reports related to containment, clean air products and safety, contact The Baker Company for our complete bibliography or visit our website at www.bakerco.com.

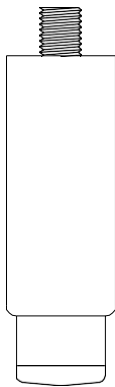
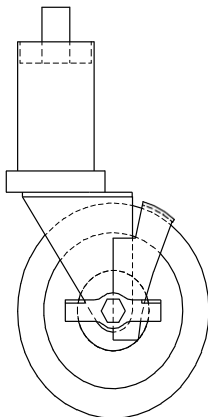
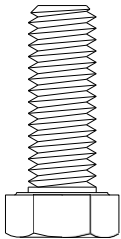
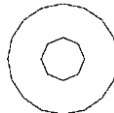
Channel stand leg assembly procedure

The cabinet is shipped with the legs bolted in the shipping position and has two work surface height settings per option:

Stand Option	Work Surface Elevation
Adjustable Leg Lever	29 ⁵ / ₈ " [752mm] to 32 ¹ / ₈ " [816mm] and 35 ⁵ / ₈ " [905mm] to 38 ¹ / ₈ " [968mm]
Caster	29 ³ / ₄ " [756mm] And 32 ¹ / ₂ " [826mm]

NOTE: caster stand option has four modified leg assemblies and two 45° stand supports (Not shown).

Remove the following parts from the hardware box shipped with the cabinet. Check the quantities with the parts list below.

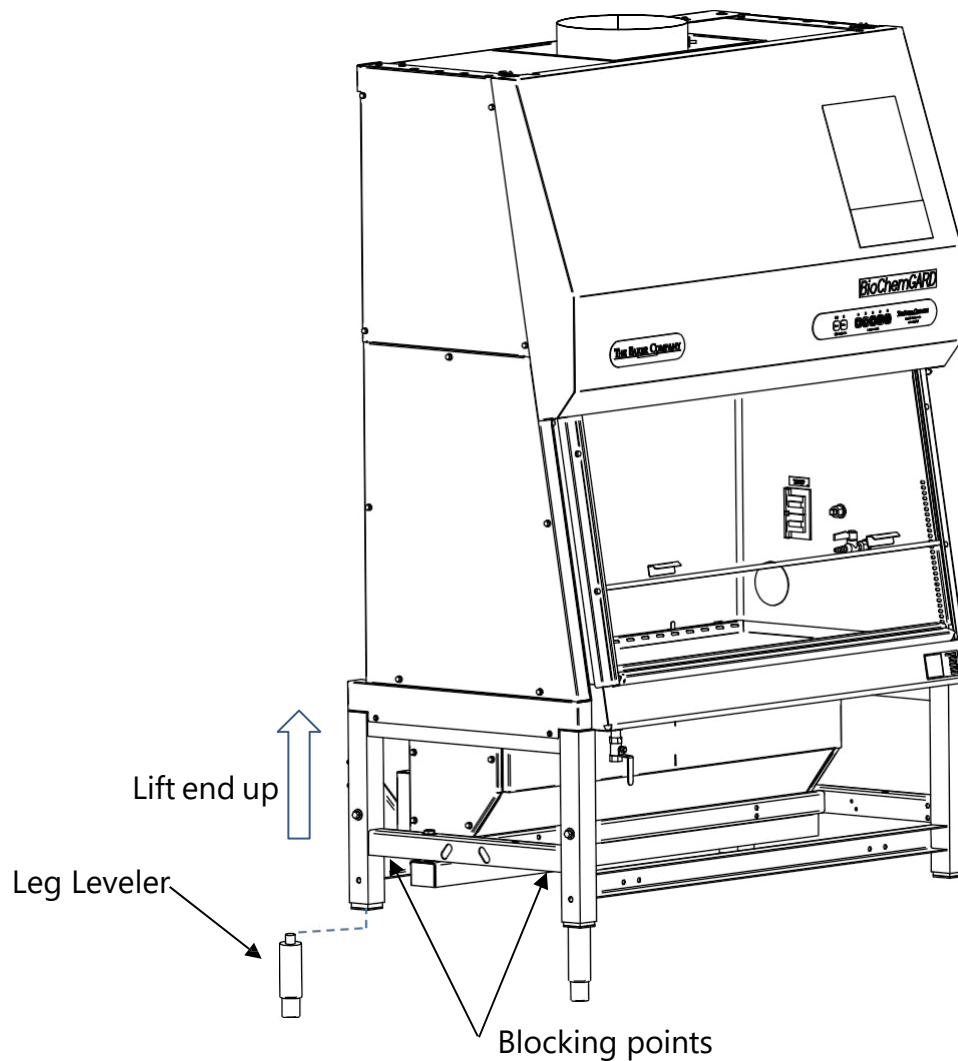
Item Number	Part Description			Quantity
1	Adjustable leg leveler (or caster, if applicable)			4
2	Hex head bolt, 3/8"-16 x 1" long			8
3	Lock Washer, 3/8"			8
4	Flat Washer, 3/8"			8
Adjustable leg leveler	Caster	Hex head bolt	Lock & flat washer	
			 	

Getting the cabinet off the pallet

1. To protect the floor finish, use a moving blanket. Carefully slide the cabinet off the pallet onto the moving blanket.
2. Slide the cabinet into its destination room before going further with the assembly/installation.

Installing the adjustable leg leveler or caster option

3. Lift one end of the cabinet/stand assembly up a minimum of 7" [178mm] and block in position. See illustration below.
4. Screw in two of the adjustable leg levelers or castors (Item# 1). Screw in by hand as tight as you can then remove the blocking.



Only the adjustable leg leveler is shown for clarity.

5. Repeat steps 3 & 4 at the other end of the cabinet.

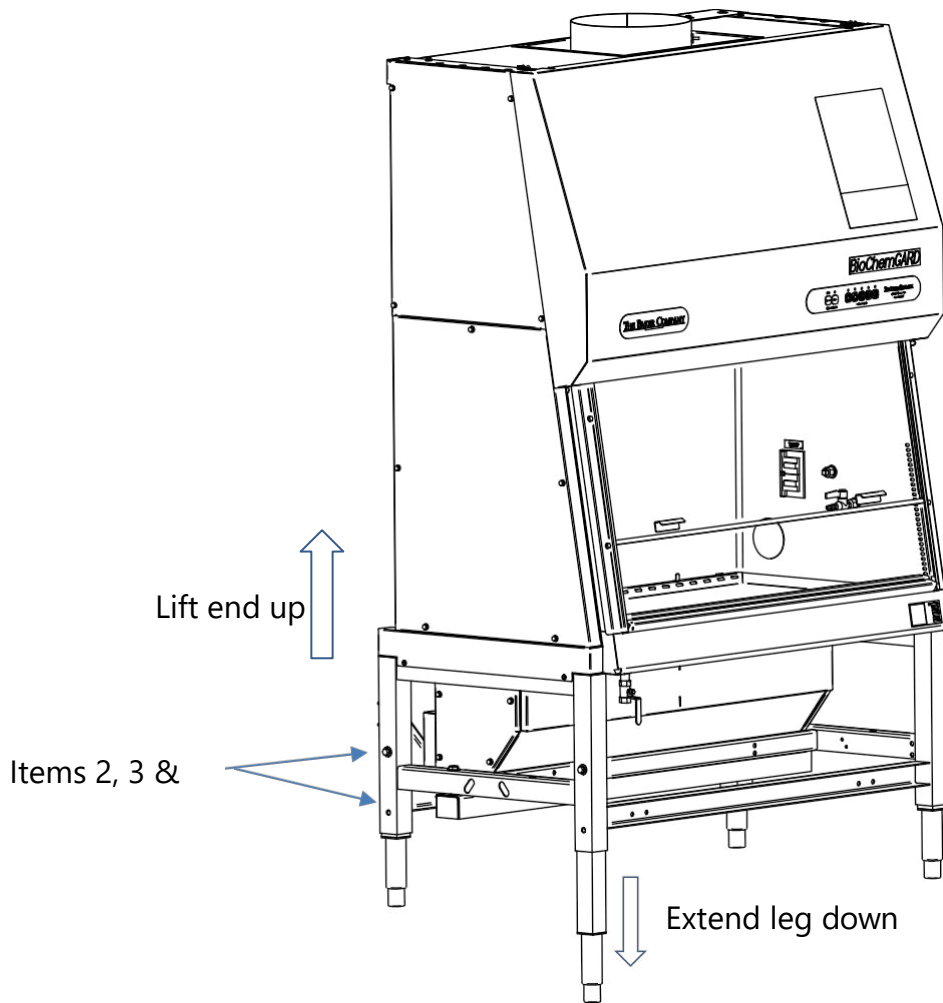
IMPORTANT

If the caster option is provided be sure to chock the previously installed casters [to prevent cabinet movement] before repeating steps 3 & 4.

Raising the unit to 29 ⁵/₈" [752mm] work surface height: adjustable leg leveler option

Raising the unit to 32 ¹/₂" [826mm] work surface height: caster option

1. Lift one end of the cabinet up a minimum of 5" [127mm] and block in position.
2. Unscrew the bolts (one per leg) that hold the legs in the shipping position.
3. Slide the leg out of the stand 2.5" [63.5mm] (2.75" [69.8mm] for castor option). Holes will be exposed at both bolt locations.

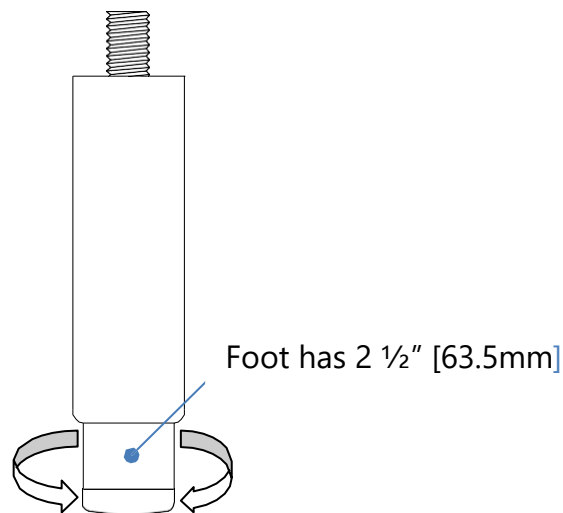


9. Bolt the leg in position with items 2, 3, and 4. (two bolts per leg).
10. Repeat steps 7 through 9 for the other leg then remove the blocking.
11. Repeat steps 6 through 10 for the other end of the cabinet.

Raising the unit to the 38 1/8" [968mm] work surface height: adjustable leg leveler option

12. Lift one end of the cabinet up a minimum of 7" [178mm] and block in position.
13. Unscrew the bolts (two per leg) that hold the legs in the current work surface height position.
14. Slide the leg out of the stand 6" [152.4mm]. Holes will be exposed at both bolt locations.
15. Bolt the leg in position with items 2, 3, and 4. (Two bolts per leg).

16. Repeat steps 14 through 16 for the other leg then remove the blocking.
17. Repeat steps 13 through 17 for the other end of the cabinet.



Rotate foot for fine adjustment to aid in leveling of cabinet

Certification

Field certification procedures

Cabinet airflow verification

WARNING

Only qualified technicians should perform this procedure.

The airflow balance, which is set at the factory, provides the cabinet with the proper air volume and velocity control to minimize leakage of airborne contamination either into or out of the work area.

In order to duplicate as closely as possible the airflow characteristics described in the original factory test report, please follow these steps:

1. Adjust the window to its designed opening height.
2. Perform down flow velocity test per NSF/ANSI 49. Specific details are on the cabinet instruction label and in the factory test report.
NOTE: The IV bar and UV light bulb need to be removed while performing down flow readings.
3. Perform inflow velocity test per NSF/ANSI 49. Specific details are on the cabinet instruction label and in the factory test report.
4. Compare the results with those originally recorded at the factory.
5. Adjust the building exhaust system as necessary. The cabinet blower speed control is set at the factory and automatically compensates for supply filter loading. Changing the building exhaust will change the cabinet exhaust/intake flow. Manual adjustment of the cabinet blower speed control is not typically required.

As the HEPA/ULPA filters load up with particulate, supply air will be maintained automatically, at least until the supply filter resistance increases 420%. When supply air eventually diminishes, it will be necessary to replace the supply HEPA/ULPA filter. The building exhaust system needs to be designed to deliver the exhaust flow at the required static pressure for a loaded exhaust filter condition. If, as the exhaust filters load, the building exhaust system is unable to deliver the airflow then the filters will need to be replaced. (See [Replacing the HEPA/ULPA Filters](#) later in the [Maintenance section](#)).

HEPA filter leak test procedure

The filters in the cabinet were tested at the factory before shipment to ensure that the media, gasket, and frame were not exceeding NSF/ANSI Standard 49 allowable leak rates. Since filters may become damaged in transport, it is recommended that the filters be re-tested by a qualified technician before the cabinet is used. The filters should also be leak tested at prescribed intervals as specified by an industrial hygienist, safety officer or other qualified person. NSF/ANSI Standard 49 details the steps for performing the filter leak test.

Filter leak test procedure – Supply filter

The following test is conducted with reference to NSF/ANSI Standard 49, Section F.5 HEPA/ULPA Filter Leak Test.

WARNING

This procedure should only be performed by qualified technicians.

Before conducting the following procedure, verify that all work area surfaces of the BioChemGARD have been appropriately surface decontaminated.

1. Leave the cabinet blower and the exhaust system running. Ensure that the cabinet is operating within the airflow set point velocities stated on the cabinet data plate. Remember, if equipped with UV light or IV bar option, these must be removed prior to measuring downflow velocities.

2. Raise the cabinet viewscreen to its fully open position.



3. With an $1\frac{1}{32}$ " nut driver or wrench, loosen (2) #8-32 hex screws located on the downflow diffuser directly behind the viewscreen.

Do not remove the screws until the next step.



4. Grasp the front edge of the supply diffuser with one hand while removing the loosened #8-32 hex screws. This will prevent the diffuser from falling into the work area.



5. Lower the front edge of the supply diffuser below the viewscreen sash and carefully remove it from the cabinet work area by pulling it down, forward and out. The back of the supply diffuser is located on pins that are welded to the back wall. Use caution not to damage the supply filter above the work area.



6. To access the top section of the cabinet, use a 3/8" nut driver or wrench to remove the 1/4" hex screws located on either side of the front dress panel.



7. Once the hardware is removed, grasp the lower portion of the front dress panel and lift outwards, then up approximately 45 degrees. Lower the left and right hand panel rests into position.



8. Now that the front dress panel is supported exposing the motor blower assembly, place a tee fitting on the end of the aerosol generator hose and attach it to the blower inlet as shown. This will be the location of the upstream aerosol introduction for supply filter testing.



9. There are two options available for determining the supply filter upstream aerosol concentration on the BioChemGARD;

- Option 1: Measuring the upstream aerosol challenge.
- Option 2: Calculating the upstream aerosol challenge.

Option 1: Measuring the Supply Filter Upstream Challenge

10. Remove the upstream challenge port fitting located directly on the top right side of the supply plenum as shown. Insert and tape over the upstream tubing attached to the aerosol photometer being used to hold in place. Space decontamination is not required for the removal of this fitting as this is a non-contaminated plenum on the BioChemGARD.



11. With the cabinet blower still operational, start the aerosol generator per manufacturer's instructions.



12. Using the photometer, measure the upstream aerosol challenge per manufacturer's instructions. **NOTE: NSF Standard 49 guidelines state a minimum upstream concentration of 10 micrograms per liter must be applied.**



13. Once the number of Laskin nozzles producing > 10 micrograms per liter of aerosol concentration is determined, set the 100% value on the photometer per manufacturer's instructions

14. (Move ahead to Step 18 for filter scanning instructions)

Option 2: Calculating the Supply Filter Upstream Challenge

15. As stated in NSF/ANSI Standard 49 the upstream challenge aerosol concentration may be calculated using the following formula:

$$\frac{\text{Number of Laskin Nozzles} \times 13,500}{\text{CFM of challenged air}}$$

16. The following values can be used in the calculation for CFM of challenged air:

- BCG401= 396 CFM of challenged air (Supply Filter)
- BCG601= 585 CFM of challenged air (Supply Filter)

By using this formula, one Laskin nozzle will provide the following upstream concentration:

- BCG401= 34 micrograms per liter
- BCG601= 23 micrograms per liter

17. Once the number of Laskin nozzles producing $\geq$ 10 micro grams per liter of aerosol concentration is determined, set the internal reference of the photometer to the values determined from the calculation

18. Scan the filter perimeter and filter media with the photometer probe no more than 1" away at a rate of no more than 2" per second. Refer to NSF/ANSI Standard 49 for verification of this information.

19. Any leak greater than .01% of the upstream aerosol concentration must be patched according to the limits stated in NSF/ANSI Standard 49 for biosafety cabinetry.



20. Once complete, remove the aerosol generator hose and re-install all parts to their original location.

Filter leak test procedure – Exhaust filters

The following test is conducted with reference to NSF/ANSI Standard 49, Section F.5 HEPA/ULPA Filter Leak Test.

WARNING

This procedure should only be performed by qualified technicians.

Before conducting the following procedure, verify that all work area surfaces of the BioChemGARD have been appropriately surface decontaminated.

1. Leave cabinet blower and the exhaust system running. Ensure that the cabinet is operating within the airflow set point velocities stated on the cabinet data plate

2. Open the viewscreen

3. Insert hooks on either side of the access opening suction slots at an elevation approximately equal to the 8" access opening



4. Lift up the front of the work surface using the lift tabs provided and hang it on the hooks.



5. Using a 3/8" nut driver or wrench, remove the 1/4"-20 hex screws located on either side of the front dress panel.



6. Once the hardware is removed, grasp the lower portion of the front dress panel and lift outwards, then up approximately 45 degrees. Lower the left and right hand panel rests into position.



7. There is only one method used in determining the upstream aerosol concentration for the BioChemGARD exhaust filter.

Calculating the Exhaust Filter Upstream Challenge

The following formula will be used to calculate the exhaust filter upstream aerosol concentration:

$$\frac{\text{Number of Laskin Nozzles} \times 13,500}{\text{CFM of challenged air}}$$

8. The following values can be used in the calculation for CFM of challenged air.

- BCG401= *664 CFM of challenged air (Exhaust Filters)
- BCG601= *993 CFM of challenged air (Exhaust Filters)

(* These values were measured by NSF International and represent the concurrent balance value [total exhaust volume])

By using this formula, one Laskin nozzle will provide the following upstream concentrations:

- BCG401= 20 micrograms per liter
- BCG601= 14 micrograms per liter

9. Once the number of Laskin nozzles producing ≥ 10 micro grams per liter of aerosol concentration is determined, set the internal reference of the photometer to the values determined in Step 7 of this section above.

10. Remove the $\frac{3}{8}$ " exhaust port plug and insert the photometer sampling probe with rigid extension tubing into the exhaust downstream port.



11. Turn on the aerosol generator and apply aerosol to each filter under the work surface starting with the filter face. Slowly "paint" the filter media face and the perimeter of the filter gasket area to check for leaks. Continue painting each filter. Also apply aerosol to the rear section of each filter.



12. If a leak greater than .005% of the upstream concentration is detected, use the aerosol nozzle to pinpoint the location of the leak. **Surface decontaminate the work surface and remove it to allow better access for fixing the leak(s). Surface decontaminate the drain pan.**
13. Patch any visual tears or holes in the filter media per IEST-RP-CC034.3 guidelines. Gasket leaks can be sealed by applying pressure to the gasket sealing area. Repeat the probe test to verify that there are no leaks exceeding .005% of the upstream concentration.
14. Once complete and filter integrity has been verified, remove the aerosol generator hose and re-install all parts to their original location.

Airflow smoke pattern tests

It is recommended that a qualified technician verify the direction of airflow within your cabinet before the cabinet is used. The direction of airflow should also be verified at prescribed intervals as specified by an industrial hygienist, safety officer or other qualified person. NSF/ANSI Standard 49 details the steps for performing the airflow smoke pattern test in their Standard 49.

Site installation assessment tests

Maintenance

HEPA filter replacement procedure

WARNING

**Only qualified technicians should perform this procedure.
Decontaminate the cabinet before changing the filters.**

During routine cabinet certification, it may be determined that it is necessary to replace the HEPA filters. This replacement would be required if proper airflow balance could not be achieved due to filter loading or if the filter is damaged beyond repair.

HEPA filters are very easily damaged. Great care must be taken when handling the filters to avoid damage to the filter media and gasket surfaces. The filters should be inspected carefully before and after installation.

A chemically contaminated filter must be handled with caution. Clothing and/or breathing apparatus should be used to protect personnel as necessary to reduce exposure to any hazards. Once removed, filters should immediately be disposed of in accordance with good safety practices and environmental regulations.

After filter replacement has been completed, the cabinet and the room should be cleaned and decontaminated in a manner consistent with the nature of the hazardous material. This includes proper disposal of all cleaning materials, along with the protective gear and clothing.

Changing the exhaust HEPA filter

ExchangeSAFE™ Exhaust Filter Replacement Procedure

WARNING

Before conducting the ExchangeSAFE™ Procedure, a risk assessment should be performed by a laboratory safety officer or qualified technician to verify the proper Personal Protective Equipment (PPE) and decontamination method(s) required for the hazards. Based on the risk assessment, procedural changes or additions may be required. In cases where hazards cannot be reduced by decontamination the use of gowning and a Powered Air Purifying Respirator (PAPR) is recommended.

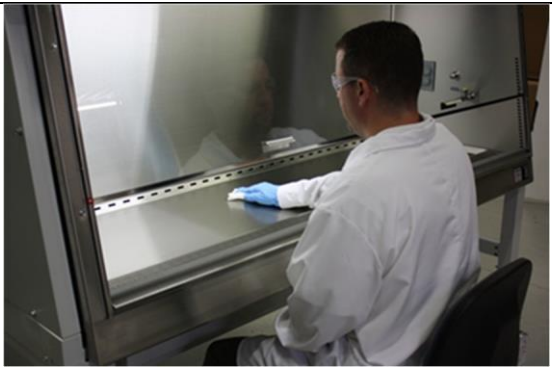
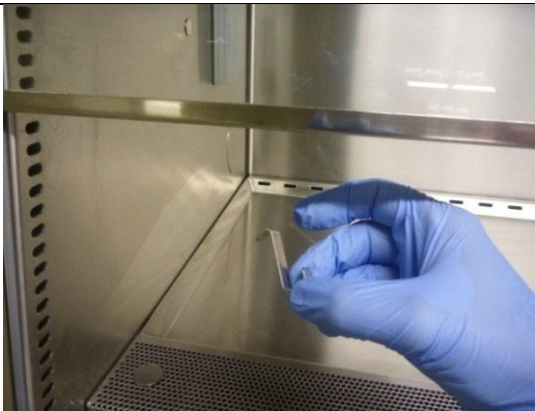
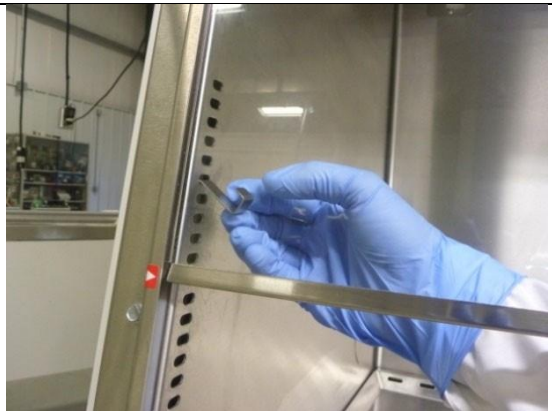
A full review of the ExchangeSAFE™ Procedure is recommended before performing a filter exchange.

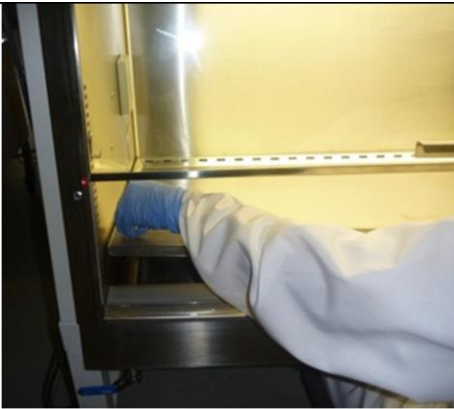
Required Materials: ExchangeSAFE™ Kit for BCG401 [Kit#372G002]
ExchangeSAFE™ Kit for BCG601 [Kit#373G002]

Each kit includes filter removal components and replacement exhaust filters for servicing one cabinet.

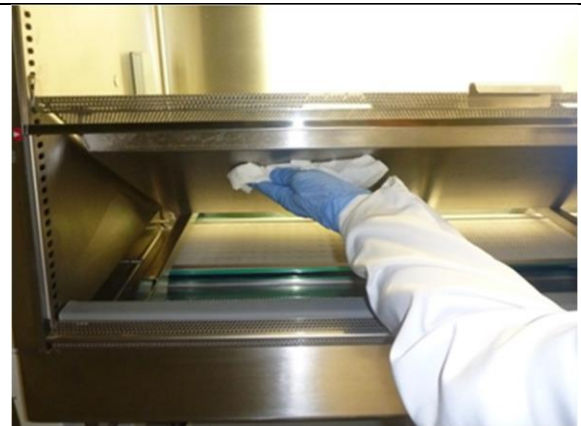
Description of Parts in kit [Part Number]	BCG401	BCG601
	Quantity of Parts	
ExchangeSAFE™, Bag-Out Cap Assembly [42119]	2	3
Filter Cover, Perforated Assembly [372A706]	2	3
Exhaust HEPA Filter [42061]	2	3
Filter lifting Tool [372A712]	2	2

SECTION I: Preparation for filter removal

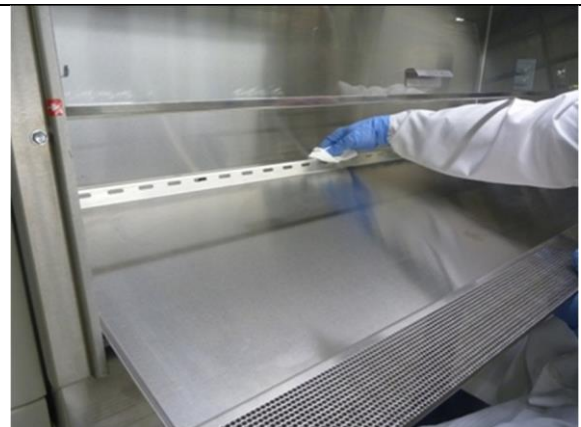
1. Remove all items from the cabinet work area.	
2. Ensure that the building exhaust system remains operational and the BCG supply fan is turned off.	
3. The viewscreen must remain at the 8" (203 mm) sash opening height during this procedure	
4. Surface decontaminate all exposed surfaces of the BioChemGARD work area, i.e., interior sidewalls, top of work surface, armrest, back of the viewscreen.	
5. Install two work surface hooks, provided with the kit, into the sidewall suction slots on both sides of the cabinet as shown. [Use the 6th slot down from the top approximately]	
	
6. Using the built in lifting tabs, raise the front of the work surface and rest it on the hooks previously installed in Step 4. This will allow access to clean the underside of the work surface.	



7. Surface decontaminate the underside of the work surface to prepare for removal in Step 8.



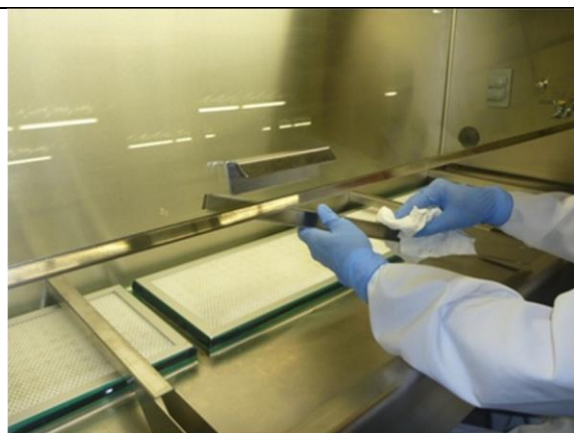
8. Finish cleaning the work surface by disconnecting it from the hooks and partially removing it from the cabinet. Approximately half of the work surface should be extended out of the cabinet opening. Rest it on the padded armrest and clean the rear portion as shown. Once decontaminated, carefully remove it and set aside.



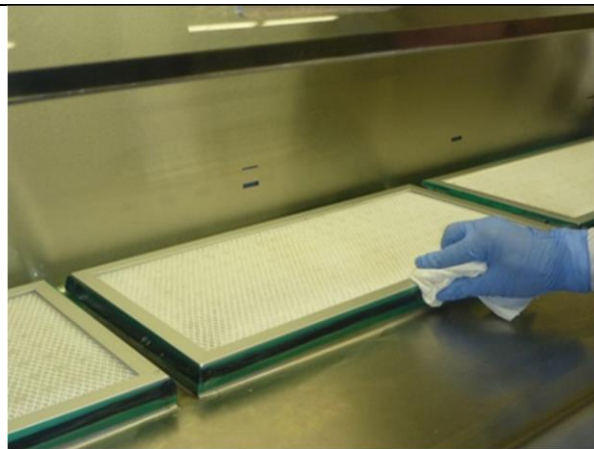
9. Surface decontaminate the top and underside of the armrest, remove, and set aside.



10. Disconnect the work surface supports from their connection to the work area back wall, lift and surface decontaminate. Remove them from the cabinet.



11. Surface decontaminate the well of the drain pan along with the top of each filter face. The drain pan surfaces between and behind the filters will be surface decontaminated later.



SECTION II: Capping and removal of filters

12. Find and remove one painted metal perforation cap from the exhaust filter kit. Remove the adhesive backing material from the perimeter of the perforated cap and place it in the drain pan area for bagging and disposal later.

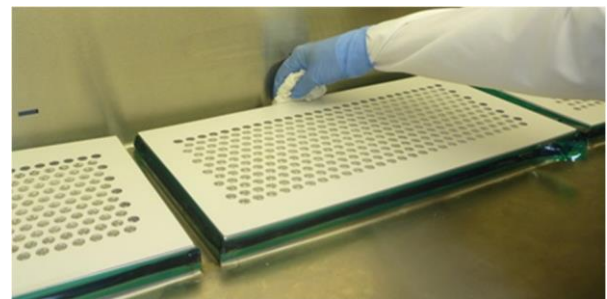
CAUTION: Do not touch the exposed adhesive as its high adhesion characteristics may damage the personal protective equipment (PPE)

13. Align the painted metal perforation cap with the top of the filter. Ensure the adhesive side is facing down and press firmly into place around the perimeter of the filter.

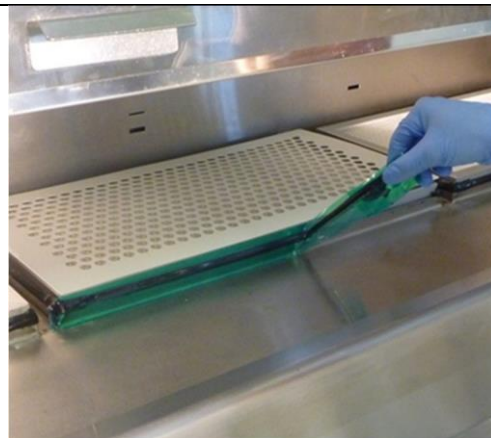
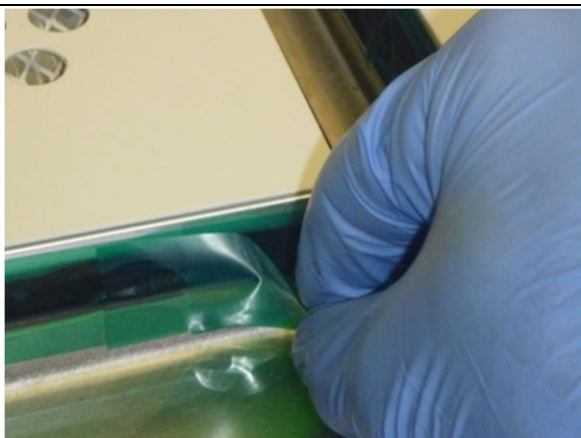
14. Repeat steps 11 and 12 until all filters are capped.



15. Once all filters have been capped, surface decontaminate the drain pan area behind and between the filters. Pay specific attention to cleaning the exposed tape surface as well.



16. When the tape is "clean", locate the sealing release tab, (a segment of tape doubled over), and slowly pull the tape away from the perimeter of the filter. As this is being done the black gasket material should pull away with the tape. Continue until all the tape and gasket is removed from each filter.



17. Locate and remove one plastic non-perforated cap with attached plastic bag from the exhaust filter kit. Remove the adhesive backing material from the perimeter of the cap assembly and place in the drain pan area for bagging and disposal later.

CAUTION: Do not touch the exposed adhesive as its high adhesion characteristics may damage the personal protective equipment (PPE).



18. Align the cap assembly, adhesive side down, on the filter you are removing. This cap assembly will be installed directly over and in connection with the perforated cover previously installed



19. Carefully lift the filter out of the cavity and place in the drain pan area on one end as shown below.



20. Unfasten the plastic bag and unroll it around the filter. Rotate the filter using the cap handles and finish unrolling the bag around the filter. Place all used materials such as wipes, removed gasket and tape into the bag and seal it closed using zip ties provided.



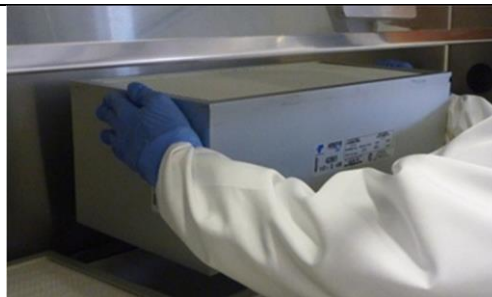
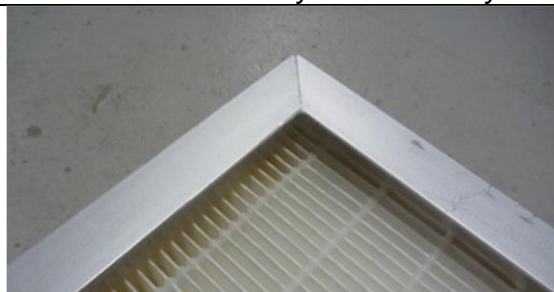
21. Remove the bagged filter from the cabinet and place it in a disposal container appropriate for the waste classification.

22. Repeat steps 17 through 21 for the remaining filters.

SECTION III: Installation of new filters

23. Wipe down the drain pan, again paying particular attention to the perimeter of the filter cavities.

24. Lift the new filter into the cabinet with the filter media protective screen facing up. Align it over the filter cavity and carefully lower it into place.



NOTE: Use caution not to touch the exposed media on the bottom of the filter.

25. Ensure knife edge penetrates gel-seal around perimeter of filter frame

26. Perform a HEPA/ULPA Filter Leak Test to ensure that there are no leaks present. See the Filter leak test procedure in Section IV of this manual. If leaks are detected in the gasket seal area apply pressure to the location and repeat leak test.

27. Place all cabinet work area components into the BioChemGARD. The ExchangeSAFE procedure is now complete.

Changing the supply HEPA filter

WARNING

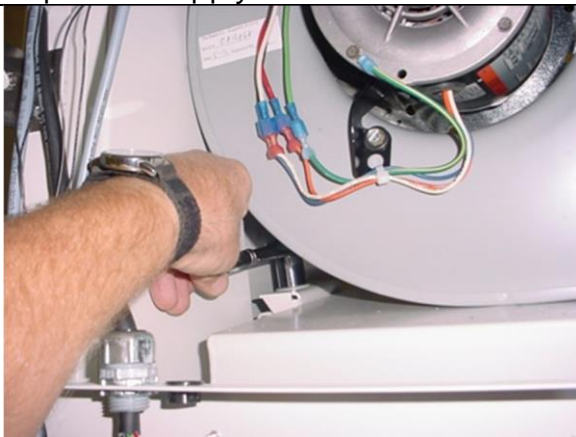
Prior to starting the supply filter replacement procedure, a risk assessment should be completed to determine the potential of biological and chemical hazards present. If necessary a space decontamination or appropriate chemical wipe down procedure may be required.

1. Surface decontaminate all interior surfaces in the cabinet work area.
2. Disconnect the cabinet power cord from the wall receptacle.
3. Using a $\frac{3}{8}$ " nut driver or wrench, remove the $\frac{1}{4}$ "-20 hex screws located on both sides of the front dress panel.

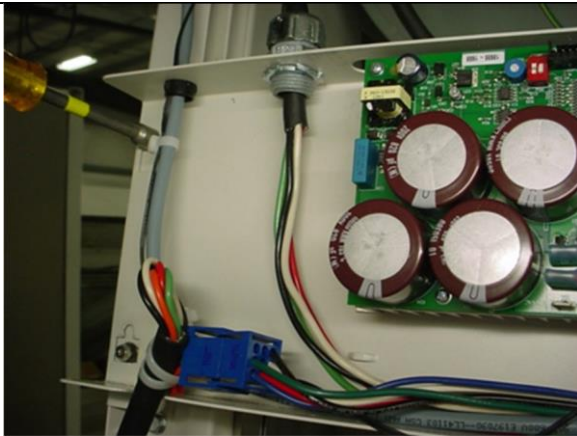
4. Once the hardware is removed, grasp the lower portion of the front dress panel and lift outwards, then up to approximately 45 degrees. Lower the left and right hand panel rests into position
5. Close the cabinet viewscreen in preparation of the supply filter removal.



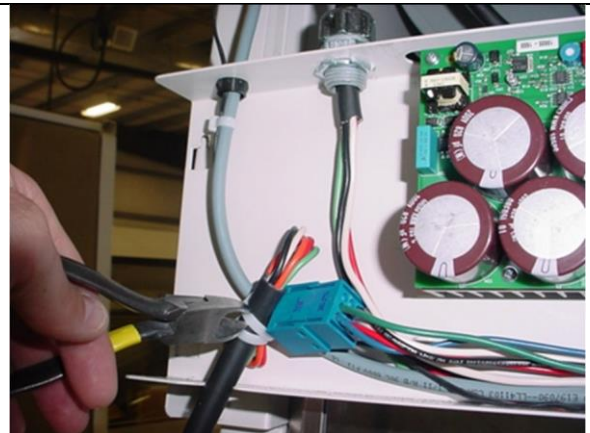
6. Loosen the (2) 1/2" hex head bolts located on either side of the supply filter plenum, alternating two or three revolutions at a time. This will raise the supply plenum evenly to provide supply filter access.



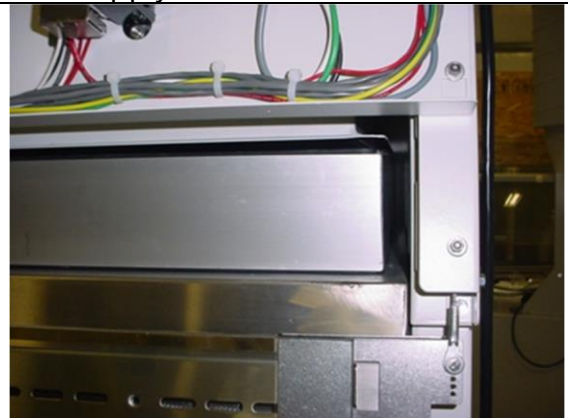
7. Using a 5/16" nut driver or wrench, loosen the 2 locknuts located on both sides of the electrical mounting board. Removal of these 4 locknuts is not required



8. Snip the cable tie from the motor blower wiring and disconnect the blue connector.



9. Remove the electrical mounting board assembly and move it up, locating the lower keyhole slot on the upper stud location allowing clearance for supply filter removal.



10. NOTE: The glass fiber media of the filter is very delicate and care must be taken not to damage it.

11. Grasp the supply filter by the frame only and carefully remove from the biosafety cabinet. The used filter should be marked appropriately and disposed of safely in accordance with environmental regulations.



12. **Note: Make sure that the airflow direction arrow on the new supply filter is pointing down.**

Slide the new supply filter all the way in until it stops against the rear filter stop. Be careful not to contact the filter media with your fingers. Align the filter frame, left to right, so it is positioned directly under the supply plenum.

13. Tighten the (2) ½" hex head bolts, alternating two or three revolutions at a time until the filter gasket is compressed approximately 1/8" [3 mm].

14. Reassemble the cabinet following the instructions above in reverse order.

15. Reconnect the power.

View screen removal procedure

CAUTION

Potentially contaminated area

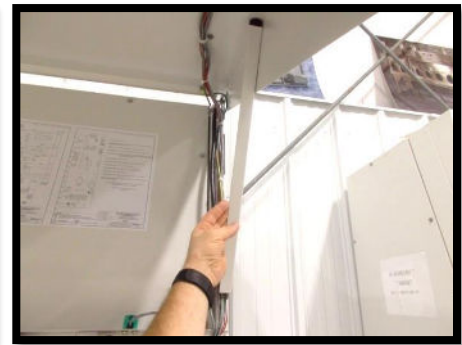
As indicted at the beginning of this procedure, a risk assessment shall be performed to determine whether or not space decontamination is necessary.

WARNING

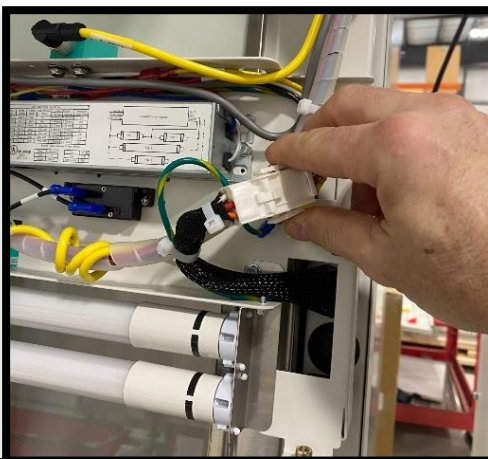
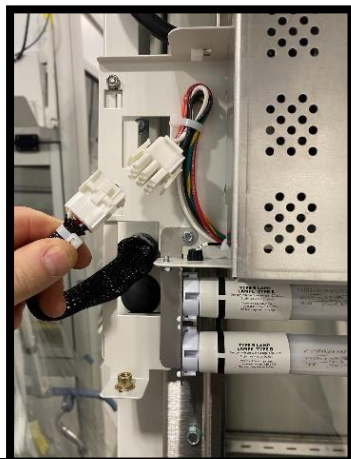
Risk of electrical shock. Refer servicing to qualified service personnel.

1. UNPLUG CABINET FROM WALL POWER

2. Remove thumbscrews or shipping bolts from front fascia panel and raise, engaging the left and right panel supports.



3. Detach both electrical quick disconnects on both sides of electrical mounting board.



4. Loosen the four hex nuts, (2 each side) from the electrical board. There is no need to completely remove these, just loosen 1 to 2 turns.

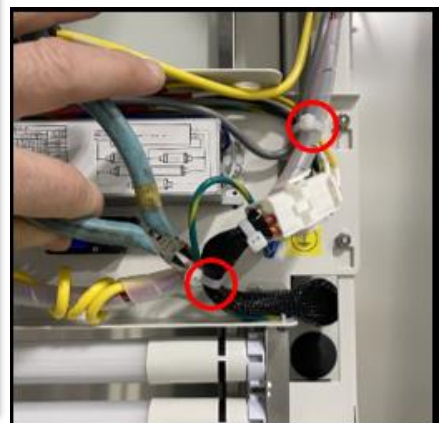


5. Next cut all plastic tie wraps on the left side of the unit used to retain the power cord. **USE CAUTION NOT TO CUT THE ELECTRICAL WIRING!**

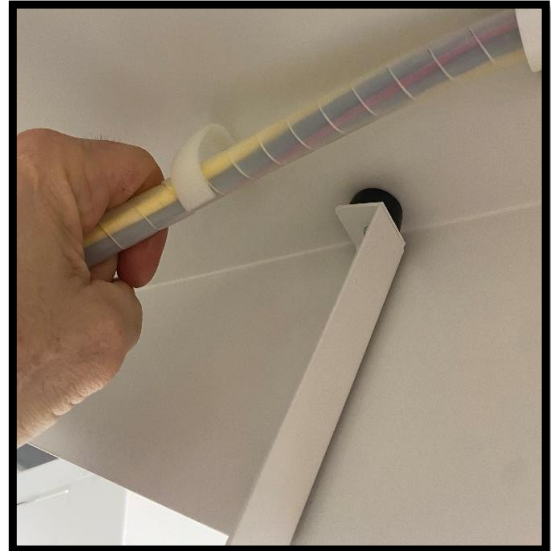


6. Next cut all plastic tie wraps on the right side of the unit used to retain all circuit board wiring. This will include two additional tie wraps on the electrical mounting board shown in the picture below on the right.

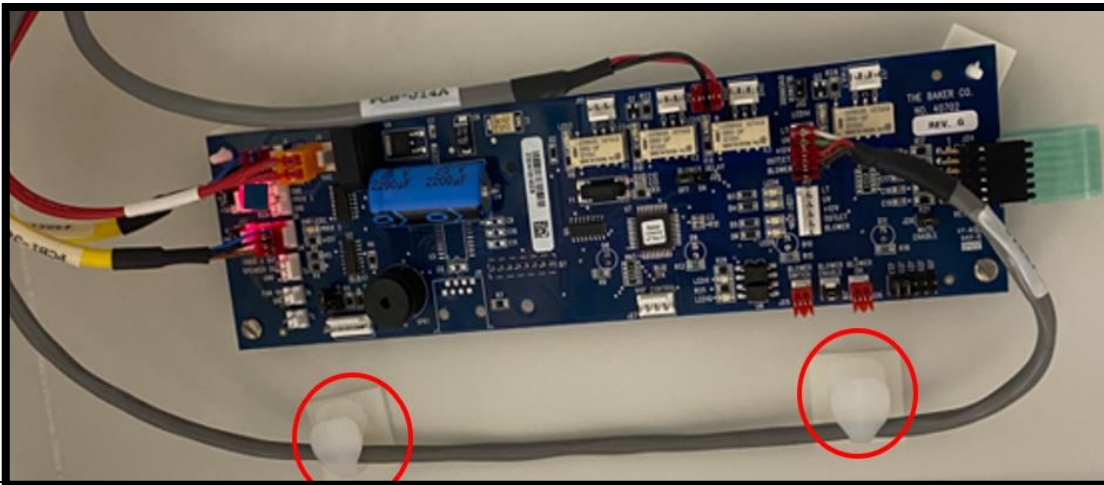
USE CAUTION NOT TO CUT ELECTRICAL WIRING!



7. Next release the circuit board wiring spiral wrapped harness from its plastic retainers. Cut the remaining two tie wraps located on the right side of the electrical mounting board shown below.



8. Next, release the cable tie clips used to retain the gray relay cable. Then note or record all cable connection wiring connections to the circuit board. The touch pad ribbon cable shown on the right in the picture below can remain attached. Each cable has a label attached indicating its proper connection to board, however additional attention before disconnection is advised.



9. Next using a step ladder, release the cable tie clips holding the power cord and carefully pull the disconnected cord towards the front of the cabinet. Note the routing of this cord for replacement later. Finally, the electrical mounting board can be removed from the cabinet and placed in a safe location.



10. Remove thumbscrews or 3/8" bolts from both left and right side viewscreen guides.



11. Raise the viewscreen completely and install an 8/32" x 1" long threaded support bolts into the tapped holes provided on left and right viewscreen guide brackets. You may need to raise the viewscreen an additional 1/2" (13mm) to install bolts. Allow viewscreen to now rest on the 8/32" bolts. This will put slack into the viewscreen cables so that they can be removed from the viewscreen.



12. Remove the two bolt assemblies used to secure the viewscreen cables using a 1/4" spin wrench. (Note which bolt hole was used on each side of the viewscreen so that when replacement is installed viewscreen will hang level.)



13. Carefully remove the viewscreen from the cabinet, by lifting it up and off. Two people are recommended for this process.

Remove the replacement viewscreen from its shipping container and place it onto the threaded support bolts installed in Step 11.

Install the bolts into the bracket bolt holes that were noted earlier and tighten. This will ensure that the viewscreen is level. (Do not overtighten bolts)



14. Follow the steps in reverse order to reassemble the unit. Use proper tie wraps to secure all cables/wires. Plug power cord into wall and check to be sure that all touchpad commands function according to user's manual. Raise and lower viewscreen to verify sash alarm and Ready Safe activation. The viewscreen replacement procedure is now complete.

LED lamp replacement procedure

1. Turn off the LED lamps by depressing the light on/off switch located on the touchpad.

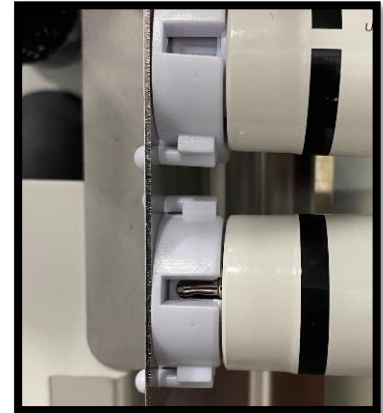
WARNING

Risk of electrical shock. Refer servicing to qualified service personnel.

2. Remove thumbscrews or shipping bolts from front fascia panel and raise, engaging the left and right supports.



3. Using both hands, grasp the lower LED lamp carefully near each end and rotate the lamp downward until the pins are visible. Now the lamp can be removed from the sockets by pulling outward on both ends.



4. Install a new lamp by doing step #3 in reverse order. Because the LED lamps are directional, it is important that the lamp is oriented properly by confirming that the labels are facing away from the cabinet workarea as shown. Press workarea light pushbutton and confirm that lamps illuminate and are positioned properly- Light shall be focused into cabinet workarea not outwards.



5. Lower the front dress panel to closed position. Press the light on/off switch again to verify that the lamp is working. Remember that the cabinet blower must be ON in order for the workarea lights to function.

6. Insert and tighten the panel fasteners on each side.

Ultraviolet lamp replacement procedure

UV germicidal lamps lose their effectiveness over time and should be replaced when the intensity at the work surface drops below 40 microwatts per square centimeter at a wavelength of 253.5×10^{-9} meters.

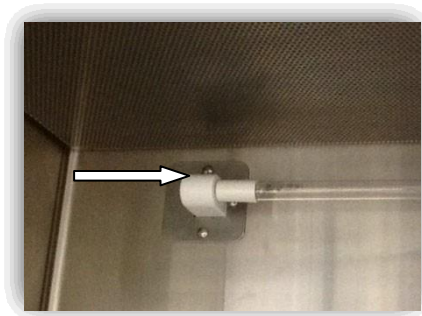
IMPORTANT

Before replacing a UV germicidal lamp it might be necessary to check with an industrial hygienist, safety officer or other qualified person in the lab to make sure that there is nothing stored in the cabinet that could potentially be a hazard to you or could be contaminated by room air.

1. Raise the viewscreen to its maximum open position. The audible & visible alarm will activate.



- 2: Using both hands, grasp the UV lamp carefully near each end and move it approximately $\frac{1}{2}$ inch [13 mm] to the right side of the cabinet until the UV lamp is released from the lamp socket on the left side. Carefully remove lamp from cabinet and dispose of it properly.



- 3: Install a new lamp by doing step #2 in reverse order. Ensure that the lamp is held securely in place.
- 4: Lower the viewscreen to full closed. This will cancel the audible alarm and flashing indicator light.

Turn on the UV light momentarily to verify that it comes on. Immediately turn the UV off again.
--

5: Raise the viewscreen to the proper sash opening height.
--

NOTICE – OSHA Federal Regulation

The following is an excerpt from the OSHA Federal Register Page 22240 and Figure J-9.

*Biological hazard signs. The biological hazard warning shall be used to signify the actual or potential presence of a biohazard and to identify equipment, containers, rooms, materials, experimental animals or combinations thereof, which contains, or are contaminated with, viable hazardous agents. For the purpose of this subparagraph the term "biological hazard" or "biohazard" shall include only those infectious agents presenting a risk or potential risk to the well-being of man.

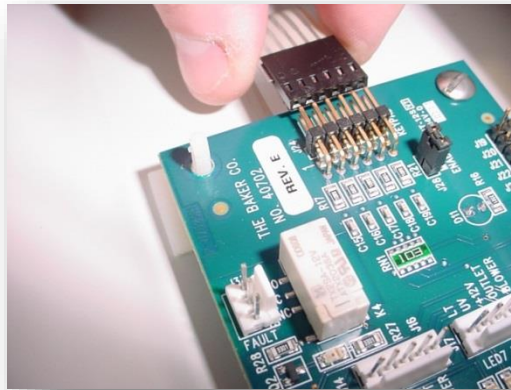
We have enclosed a sign featuring the Biohazard Symbol.

We recommend that you attach this sign to the unit in a prominent location if you plan to perform any work in the hood with agents that present a risk or potential risk to the well-being of man.

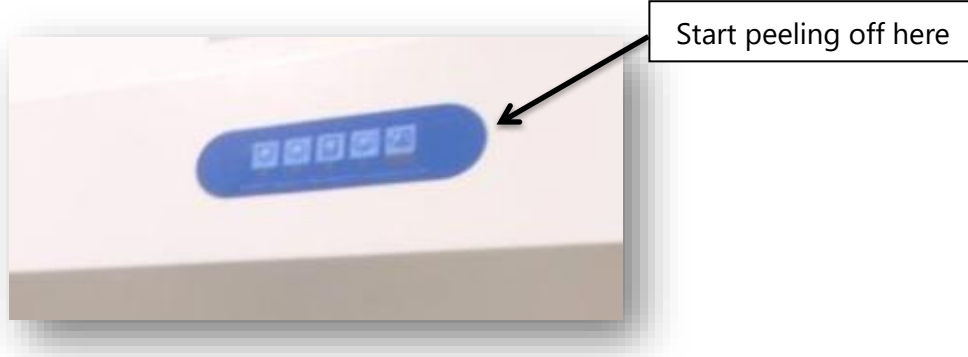
Touchpad replacement procedure

Step 1: Unscrew and raise the front dress panel as previously described

Step 2: Carefully remove the touchpad ribbon cables from the Membrane Switch Controller (MSC) board located on the inside of the dress panel



Step 3: Close the front dress panel again and pry at one side of the membrane touchpad using your fingers until it releases from the painted surface. Slowly pull it away from the panel until removed and slide ribbon cable through the slot for complete removal



Step 4: If needed, remove any residual adhesive from the painted surface by applying adhesive remover to a clean cloth or towel.

NOTE: Do not spray any remover directly onto painted surface as this may damage the electronic control board mounted on the opposite side.

Step 5: Remove protective backing material from replacement touchpad and insert ribbon cable into rectangular cutout. The connection to the electronic control board will be completed in the next step.

NOTE: Be careful not to contact the exposed adhesive backing as this can affect its adhesion.

Step 6: Grasp the touchpad at both ends, and carefully position onto the front dress panel making sure of correct alignment before applying pressure that will activate adhesion.

Step 7: Reconnect the ribbon cables to the electronic circuit board
Step 8: Close the front dress panel and reconnect power to the cabinet; activate all push button switches to verify proper operation of controlled components.

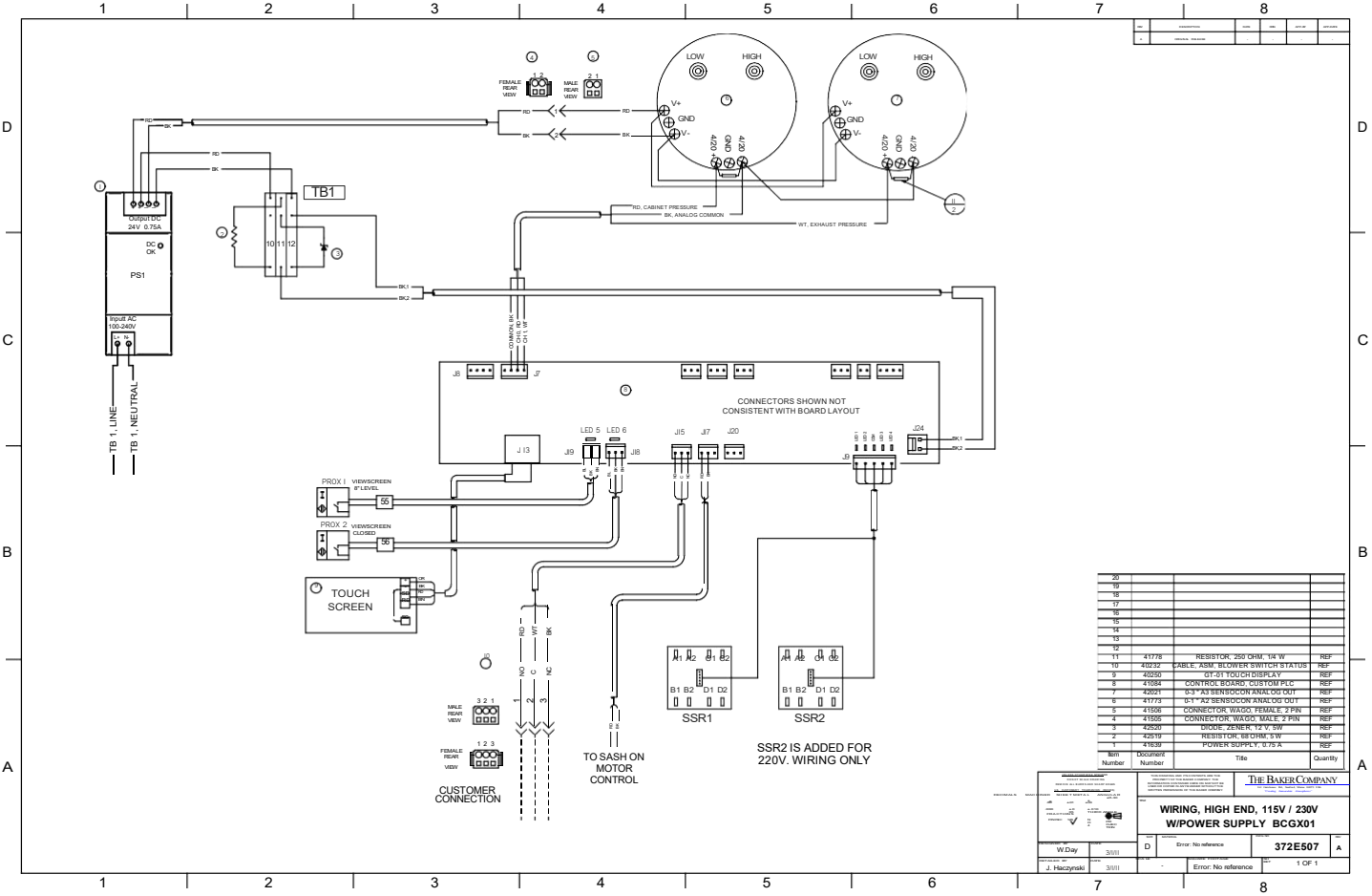
Replacement part list

Electrical Items	BCG401	BCG601
LED lamp	45657	45658
Ultraviolet lamp	18024	18025
LED lamp holders	45788	45788
Ultraviolet lamp holders – plunger end / fixed end	20281 / 20283	20281 / 20283
Ultraviolet ballast	40899	40899
Circuit breaker [outlets]	34332	34332
Motor Drive, 3 Phase	41988	42171
Transformer	34327	34327
Relay, solid state	44692	44692
Terminal block assembly	42017	42017
Viewscreen position sensor/cable assembly	372A534	372A534
Control Board w/AFM Passthrough	42048	42048
Label, Touchpad, SW, Overlay	43638	43638
Airflow monitor, AFM	42096	42096
Airflow monitor, Low Range Probe	41935	41935
Ground fault interrupter outlet with indicator light	34921	34921
Motor/Blower assembly	372A204	372A204
(Option) Hi-End- Controller Board	40184	40184
(Option) Hi-End- Touch Screen Interface	40250	40250
(Option) Hi-End- Power Supply	41639	41639
Digital pressure monitor, 0-1 inch W.C.	41773	41773

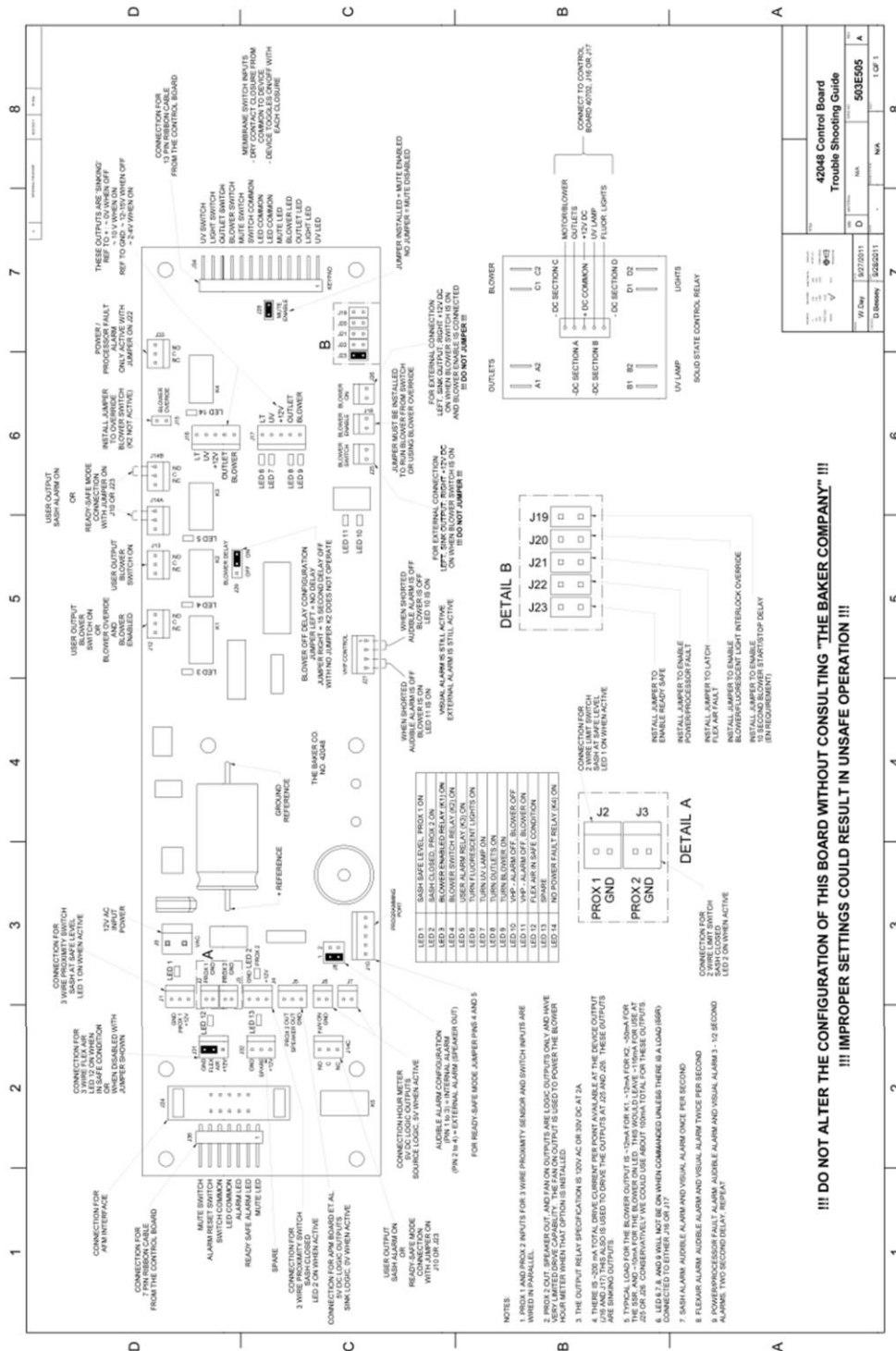
Mechanical Items	BCG401	BCG601
Supply HEPA filter	41978 (18"x48"x3.54")	42005 (18"x72"x3.54")
Exhaust HEPA filters	42061 Qty – 2 (11.15"x22.08"x8")	42061 Qty - 3 (11.15"x22.08"x8")
Armrest pad	41547	41549
Work surface	372X103	373X102
Work surface support	372P112	372P112
Down flow diffuser	372P114	373P104
View screen Assembly	372A305	373A302
View screen track, right hand	355A305	355A305
View screen track, left hand	355A304	355A304
Cable, right side, view screen	41989	41989
Cable, left side, view screen	41990	42019
Cable Port Gasket	41126	41126
Cable Port Plug Assembly	191A706	191A706
Analog Pressure Gauge, 0-0.50" W.C	20773	20773
Analog Pressure Gauge, 0-25 mm W.C.	41078	41078

Ladder Schematic:

Enhanced Control Wiring: (372E507 1)

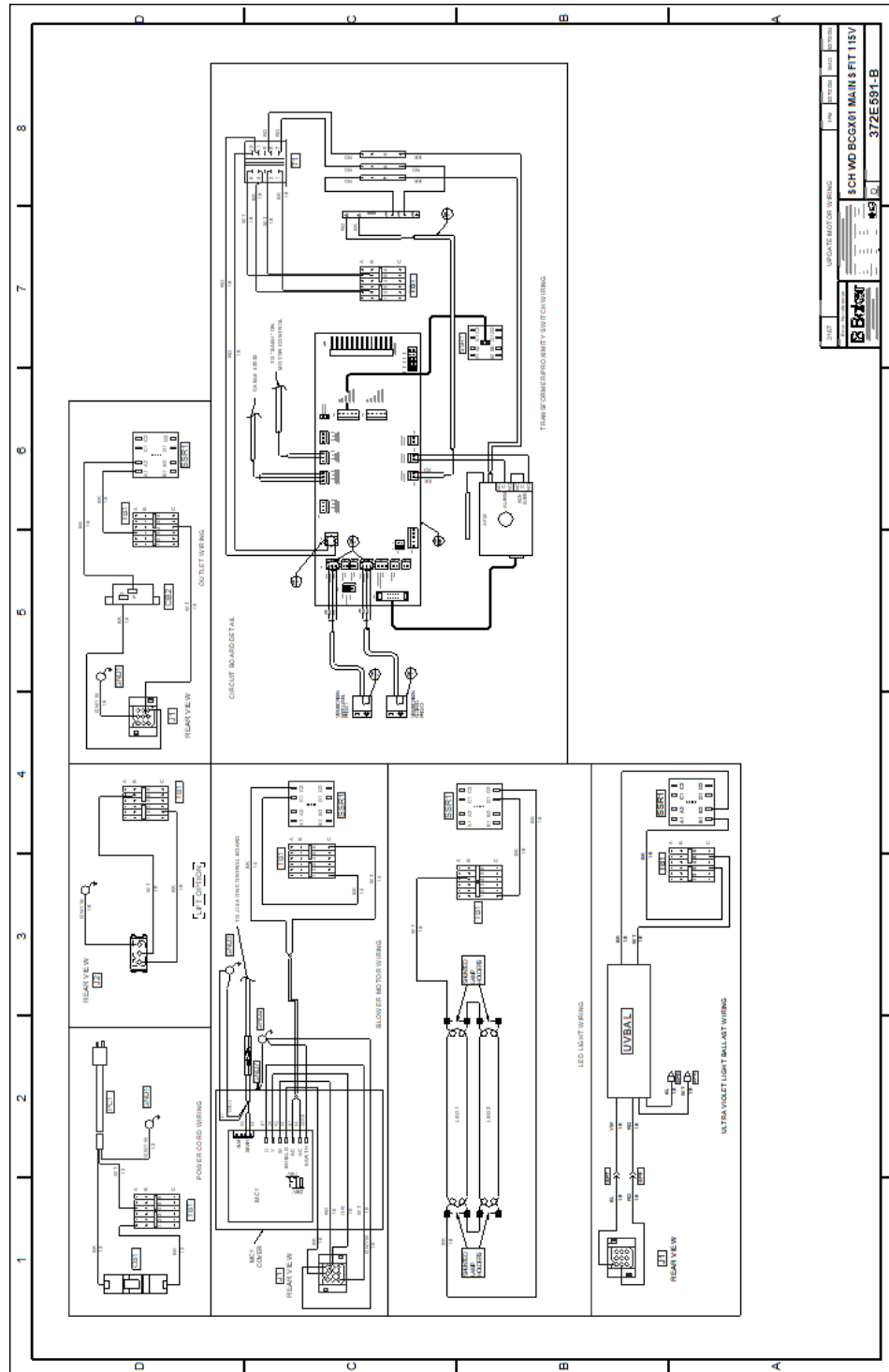


Troubleshooting Guide for Control Board

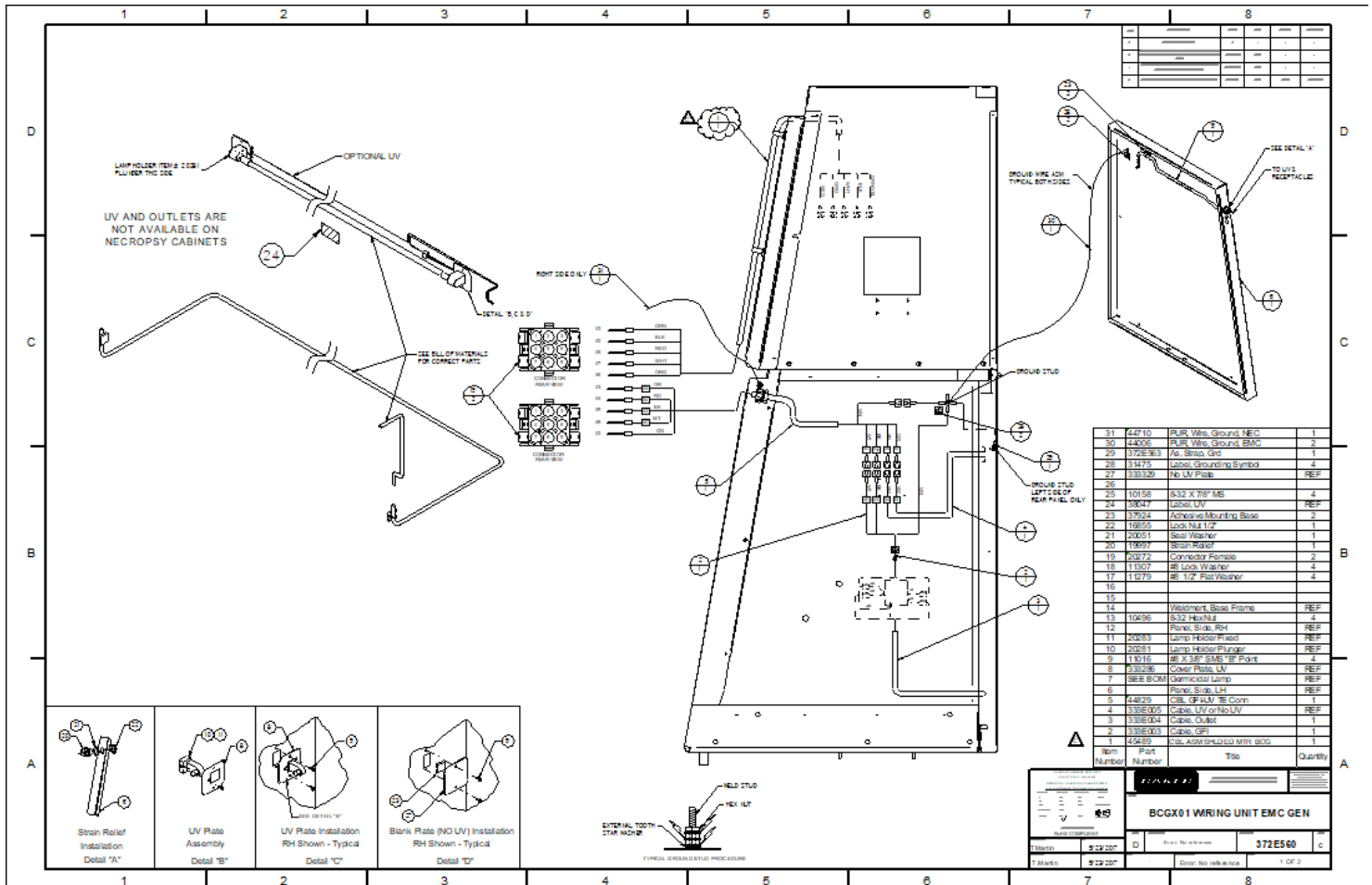


Electrical panel assemblies/wiring

BCGX01 Electrical Panel



BCGX01 Unit Wiring:



Unit wiring

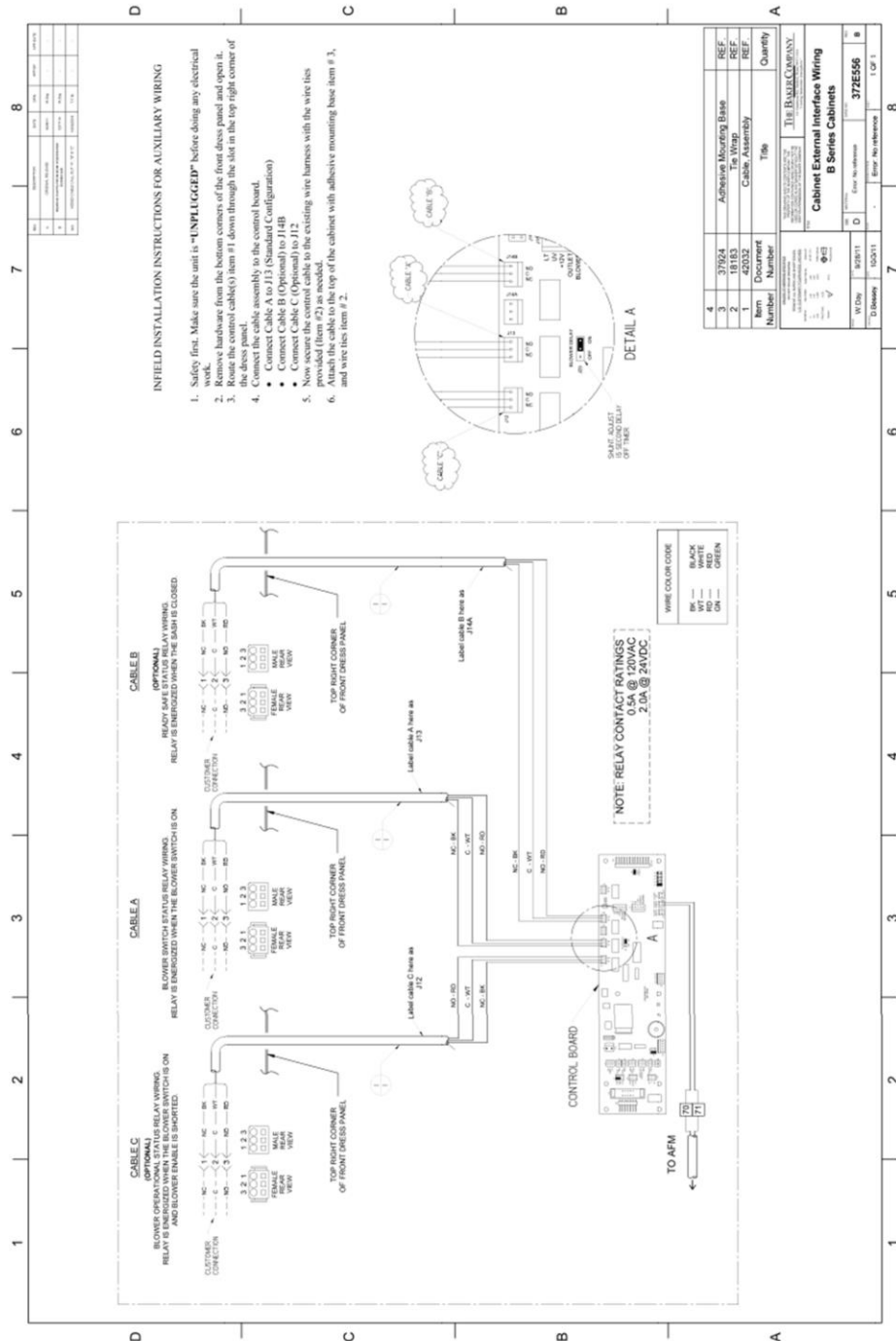
Auxiliary blower switch status wiring option

All BCG401/BCG601 units will have the Auxiliary Blower Switch Status Wiring installed as a standard configuration. This package includes wiring that connects to the blower switch status relay on the control board. Refer to the General Arrangement Drawings for locations. This wiring allows the customer to connect the unit to an external system to monitor the switch status or to connect to a control circuit for an external blower or damper in their exhaust system.

When the customer wants to monitor additional conditions in the unit, they can order the optional ReadySAFE™ Status Relay Wiring and/or Blower Operational Status Relay Wiring. These connections allow the customer to connect to their external systems or control circuits.

The Auxiliary Wiring Options are detailed in drawing 372E556.

Auxiliary Wiring Options drawing



Alarm Conditions

Standard cabinets utilize the sash alarm; however three more alarms are also indicated. Below are brief descriptions of each of the alarm conditions that may be present on your cabinet. Additional information can be found by referencing the Troubleshooting Guide for Standard Board, *Dwg-503E505*, in the appendix of this manual.

The Sash Alarm occurs when the view screen is not at a safe operating position and alerts the user with a visual and audible alarm once per second. There is a 3 second delay before the alarm activates, to allow the end user time to move between safe operating positions. Pressing the mute button on the keypad will stop the audible alarm, however the visual alarm will continue until the view screen is placed at an appropriate level. If the sash position is not corrected, the audible alarm will return in five minutes.

The Power/processor Fault Alarm occurs when the system experiences a power outage or the microcontroller processor has a fault. This alarm can be enabled by placing a jumper on J22 of the control board. An indication of this fault is a visual and audible alarm of three 1 second alarms followed by a two second delay. This cycle is repeated until the alarm condition is cleared by pressing the mute key. Relay K4 will be inactive with LED 14 OFF when in alarm, and energized with LED 14 ON when no alarm is present.

The Double Proximity Sensor Fault alarm occurs when both Sash Position proximity sensors are activated simultaneously. This is a condition that should not be able to occur in normal operation. A visual and audible alarm four times per second indicates this fault condition. Below is a table which will help to determine which proximity switch is at fault:

SASH POSITION	LED 1 - ON	LED 2 - ON
CLOSED	FAULT	NORMAL
SAFE OPERATING POSITION	NORMAL	FAULT
FULLY OPEN	FAULT	FAULT

ReadySAFE™ Operation

The ReadySAFE™ Mode is a feature that reduces the total airflow and energy consumption of the cabinet when it is not being used. Operation of the cabinet in ReadySAFE™ Mode maintains personnel, product and environmental protection. The ReadySAFE™ Mode is activated when the viewscreen is in the fully closed position. While the ReadySAFE™ mode is active the blower speed will be reduced and the work area lights automatically turn off. When the sash is returned to safe operating height the cabinet airflow will return to the original set point. The work area light can then be turned on. In order for the ReadySAFE™ feature to be enabled there must be a jumper installed on J23 of the control board. Further reference to connections on the control board can be found in the Auxiliary Wiring Options section of this manual.

Air Flow Monitor Functions

AFM adjustment should only be performed by a qualified certification company or biological safety professional.

The Air Flow Monitor (AFM) is located behind the cabinet dress panel on the right side of the cabinet. The indicators and control pushbuttons are located on both the AFM instrument and on the cabinet operator controls located on the front of the cabinet dress panel. The AFM is a thermal air monitoring device. The air flow probe is located in the air plenum on the back of the cabinet and is accessible from the front of the cabinet by removing the motor/blower assembly.

The AFM is designed to monitor the air flow and provide audible and visual alarms in both normal operation and ReadySAFE™ operation. The instrument has the following indicators and controls: there are four LED indicators, a green Power indicator, a red Alarm indicator, a yellow ReadySAFE™ alarm indicator and a blue Mute indicator. There is an audible alarm. There are two pushbuttons, one to reset Alarm conditions, and one to Mute the audible alarm. There are two adjustment potentiometers, one for the normal operation alarm point and one for the ReadySAFE™ alarm point. The Alarm, ReadySAFE™, and Mute indicators as well as the Alarm reset and Mute pushbuttons are duplicated on the cabinet operator controls located on

the front of the cabinet. The instrument also has two isolated Form C relay outputs to allow connection with other devices or systems. One relay is associated with the normal operation alarm, the other relay is associated with the ReadySAFE™ operation alarm.

There are no time delays programmed into the AFM control. The airflow probe may have an approximately 4 second delay responding to a large change in airflow. This is due to the thermal properties of the air flow sensor.

The function of the AFM LED indicators:

LED operation at Start Up:

When power is applied to the AFM the red Alarm LED, yellow ReadySAFE™ Alarm LED and blue Mute LED will be ON solid for approximately 20 to 30 seconds. This is an indication that the AFM is powered but is not monitoring the airflow alarm conditions. This time is essentially the time necessary for the thermal properties of the air flow probe to stabilize and provide an accurate reading.

Green Power LED:

This LED indicates that power is applied to the AFM. When power is first applied or if a power interruption has occurred this LED will flash. Pressing the Alarm Reset pushbutton with power applied changes the LED to solid ON operation.

Red Alarm LED:

This LED indicates the alarm condition when the cabinet is in its normal operating mode with the sash/viewscreen open. During normal operation this indicator is OFF. When an alarm condition exists, this indicator will flash at a fast rate. If the alarm condition clears before being acknowledged by pressing the Mute pushbutton, the indicator will change to solid ON. Pressing the Alarm Reset pushbutton once the alarm condition has cleared will change the indicator to its normal OFF condition.

Yellow ReadySAFE™ Alarm LED:

This LED indicates the alarm condition when the cabinet is in the ReadySAFE™ operating mode with the sash/viewscreen closed. During normal ReadySAFE™ operation this indicator is OFF. When an alarm condition exists, this indicator will flash at a fast rate. If the alarm condition clears before being acknowledged by pressing the Mute pushbutton, the indicator will change to solid ON. Pressing the Alarm Reset pushbutton once the alarm condition has cleared will change the indicator to its normal OFF condition.

Red and Yellow LEDs:

When an equipment problem exists, that is, a missing air flow probe or the remote display cable is disconnected, the Red and Yellow LEDs will alternately flash at a fast rate. When the equipment problem is corrected, both the Red and Yellow LEDs will be ON solid. Pressing the Alarm Reset pushbutton once the alarm condition is corrected will change the indicators to the normal OFF condition.

Blue Mute LED:

This LED indicates that the Audible Alarm has been muted. The Mute LED flashes at a fast rate while the Audible Alarm is muted.

The function of the Audible Alarm:

During normal operation the Audible Alarm is OFF. When an alarm condition exists in either the normal or ReadySAFE™ operating mode, or in the case of equipment issues, the Audible Alarm will 'beep' at a fast rate. If the alarm condition clears before being acknowledged by pressing the Mute pushbutton the Audible Alarm will change to 'beeping' at a slower rate. Pressing the Mute pushbutton will silence the Audible Alarm for approximately 5 minutes

The function of the AFM Pushbuttons:

Alarm Reset pushbutton:

The Alarm Reset pushbutton is used to acknowledge a power interruption condition. Pressing the Alarm Reset pushbutton when the AFM is powered and the green LED is blinking will change the green LED to solid ON.

The Alarm Reset pushbutton is used to acknowledge or reset the indicated alarm condition of either the normal or ReadySAFE™ operation. If an alarm condition currently exists, pressing the Alarm Reset pushbutton will have no effect on the displayed alarm indications. If an alarm condition has existed, but is has cleared or has been corrected, pressing the Alarm Reset pushbutton will clear both visual and audible alarm indications.

Mute pushbutton:

The Mute pushbutton is used to silence the Audible Alarm when an alarm condition exists. When the Audible Alarm is ON, pressing the Mute pushbutton will silence the Audible Alarm for approximately five minutes. If the alarm condition continues to persist, the Audible Alarm will return. The Mute pushbutton can be used to repeatedly silence the Audible Alarm in five minute increments.

The function of the Alarm Setting Potentiometers:

When adjusting the alarm setpoints, first turn the Alarm Setting Potentiometers fully clockwise (CW).

In order to set an alarm setpoint the cabinet airflow must be set to an alarm condition. With the cabinet airflow at an alarm condition rotate the respective Alarm Setting Potentiometer counter clockwise (CCW) until the respective Alarm LED indicates an alarm condition. This will be close to the alarm setpoint. In the case of the normal operation alarm this will turn off the cabinet blower, so the airflow will change. Turn the Potentiometer very slightly CW. Return the

airflow to the cabinet setpoint, then reduce the airflow gradually until the alarm condition occurs. If this is at the proper point no further adjustment is needed. This procedure may need to be repeated a few times to achieve the desired alarm setpoint.

For more detailed information on setting the alarm setpoints refer to the Factory Test Report that was shipped with the cabinet.

The function of the Alarm Relays:

The Alarm Relays are an isolated Form C (Normally Open [NO], Common [C], Normally Closed [NC]) relay. When power is applied the relays are not energized for approximately 20 seconds, indicating an alarm state. At that point they will respond to the conditions indicated by the measurement from the air probe and the AFM alarm circuitry. If an alarm condition exists the relays will not be energized. If no alarm condition exists the relays will be energized which changes the state of the relay (i.e. [NO] contact changes to closed [NC], etc).

The relay contact electrical specification is 1 Amp at 30V DC, and 0.5 Amp at 125V AC (resistive).

Programmable Delay Off Time Function

The following procedure can be used to program a Delay Off time for UV, outlets or work area lights. There is no delay programmed when the unit is shipped from the factory. **NOTE - The device to be programmed should be in the OFF condition before you start programming.**

15 minute increment programming:

1. Press and hold the pushbutton of the device you want to program.
2. In about 3 seconds you will hear a short 'beep'. This indicates that you have turned the device ON, are in the programming mode for the device and have programmed it to turn OFF in 15 minutes. Release the pushbutton.
3. Each subsequent press of the device pushbutton while in the programming mode will add 15 minutes to the Delay Off time. (i.e. pressing the pushbutton 3 additional times would set the delay to 60 minutes, 15 minutes initially plus 3 x 15 minutes additional delay times).
4. The device control will remain in the programming mode for about 4 seconds if the pushbutton is not pressed.
5. Once the programming mode for the device has ended the device can be turned OFF normally, if desired, by pressing the device pushbutton.
6. The programmed device will turn OFF automatically at the end of the Delay Time.
7. Each time a programmed device is turned off manually or automatically the programming is cleared and must be reentered, if desired.

1 hour increment programming:

1. Press and hold the pushbutton of the device you want to program.
2. In about 3 seconds you will hear a short 'beep'. Continue to hold the pushbutton. In about an additional 3 seconds you will hear a longer 'beep'. This indicates that you have turned the device ON, are in the programming mode for the device and

have programmed it to turn OFF in 1 hour. Release the pushbutton.

3. Each subsequent press of the device pushbutton while in the programming mode will add 1 hour to the Delay Off time. (i.e. pressing the pushbutton 3 additional times would set the delay to 4 hours, 1 hour initially plus 3 x 1 hour additional delay times).
4. The device control will remain in the programming mode for about 4 seconds if the pushbutton is not pressed.
5. Once the programming mode for the device has ended the device can be turned OFF normally, if desired, by pressing the device pushbutton.
6. The programmed device will turn OFF automatically at the end of the Delay Time.
7. Each time a programmed device is turned off manually or automatically the programming is cleared and must be reentered, if desired.

Start-up Procedure

1. Make sure that the building exhaust system is operating properly and the cabinet AFM is not in alarm. If the cabinet has not been left running continuously, then turn on the cabinet blower. An indicator light located above the switch will illuminate when the switch is on. Listen for the soft sound of the cabinet blower running. If equipped with an optional analog pressure gauge, check the readings on it, it should have a pressure reading consistent with the last time the cabinet was on.
2. Turn on the work area light. **NOTE: The Work area Light will not operate unless the blower switch is on. The work area light will not operate unless the viewscreen is opened.**
3. Check to determine that the drain valve is in the closed position or the drain coupling is capped.
4. If your cabinet has been purchased with the optional ultraviolet light (UV), lower the viewscreen to its fully closed position and turn the UV light on to make sure it is operational. **NOTE: The UV light option features a safety interlock that prohibits UV operation unless the viewscreen is fully closed.**

5. Wipe down the interior area of the cabinet with surface disinfectant. **NOTE: Some disinfectants, such as bleach or iodine, may corrode or stain the steel surfaces. Good practice is to thoroughly clean the surface afterward with a detergent and rinse with sterile water to prevent corrosion.**
6. Place all materials to be used for the next procedure inside the cabinet on the solid work surface. **Disinfect the exterior of these materials prior to placing them on the work surface.** Everything required (and nothing more) should be placed in the cabinet before beginning your work so that nothing passes in or out through the air barrier, until the procedure is completed. Implements should be arranged in the cabinet's work area in logical order so that clean and dirty materials are segregated, preferably on opposite sides of the work area. Blocking the front and rear perforated grilles must be avoided. If wipes or absorbent towels are used on the work surface, be sure to keep them away from the grilles.
7. After equipment is in place inside the cabinet, adjust the sliding viewscreen so it is open to the correct certified access opening height. An alarm will signal if the viewscreen is not at a safe level. This is important to maintain proper cabinet airflow.
8. Begin working in the cabinet only after it has run for at least three minutes with the viewscreen in the proper position.

Auxiliary cabinet monitoring wiring option

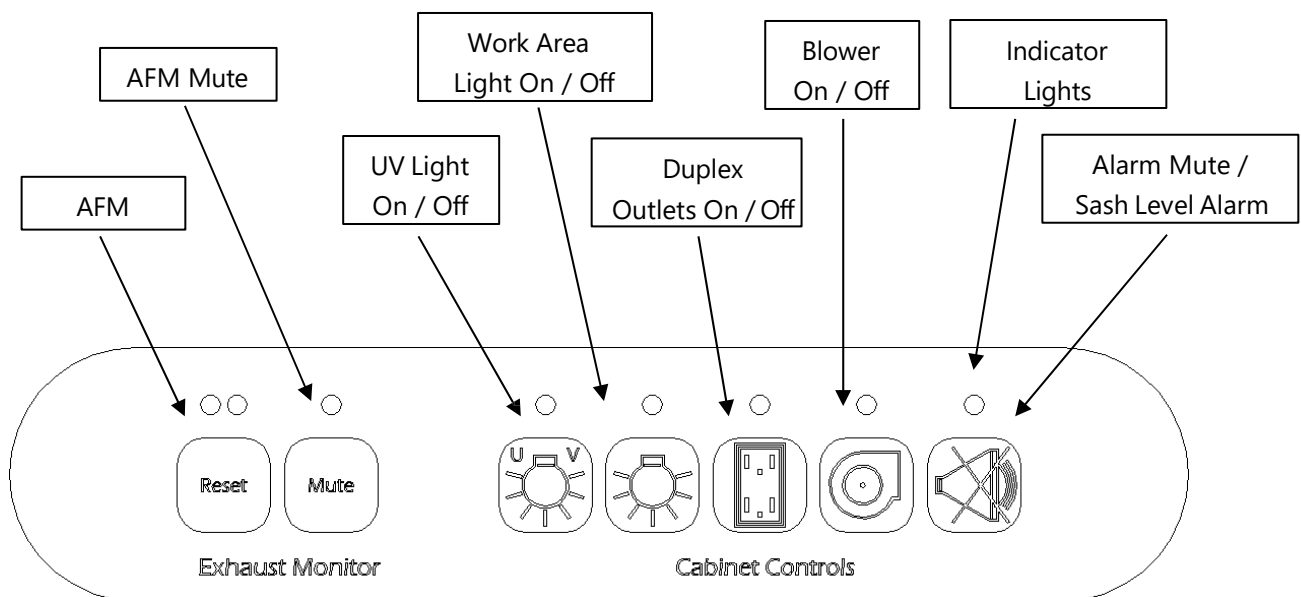
Trouble Shooting

Here are some suggestions based on our experience with the use and misuse of biological safety cabinets.

WARNING

Risk of electrical shock! Disconnect power supply before opening the front dress panel or refer servicing to qualified service personnel.

The following diagram will be used as reference in this troubleshooting section.



If there is no down flow air within the work area-

1. Make sure the cabinet is plugged in and the blower switch is turned on. The green indicator above the button should be lighted.
2. Check the Air Flow Monitor indicator located directly above the button labeled RESET. If flashing "RED" and audible alarm are present, check all airflow monitor cables first for proper connection, then verify that the required exhaust flow and static pressure have

been met. All Class II Type B2 cabinets must be equipped with a supply fan interlock that shuts the fan off when the building exhaust flow is below the required setting. Refer servicing to qualified cabinet certifier.

If the Work area Light doesn't work-

1. As an additional safety feature for your BioChemGARD, the work area light cannot be turned on when the blower switch is turned off. Verify that the blower switch is on (indicated by green LED) before pressing the work area light switch. The work area light will not operate with the viewscreen in the closed position and the ReadySAFE™ mode is active. The blue LED above the switch will be on when the work area light is on.
2. If work area light is still inoperative, disconnect the electrical power supply, open the front dress panel and check that the bulb is properly installed in the lamp sockets. Replacement of the bulb may be required. Have a qualified electrician check the wiring to ensure that proper voltage is supplied to the ballast.

When the Viewscreen Sash Alarm is sounding-

NOTE: The indicator above the alarm-reset button will flash.

1. Make sure the viewscreen sash is at the correct position indicated by the red and white arrows located on either side of the viewscreen guides. The audible and visual alarm should be silent when the window is at this proper design opening or placed in the fully closed position. When activated, the audible alarm can be silenced for five minutes by pressing the Alarm-Mute button. However, the visual alarm indicator will continue to flash. After five minutes, the alarm will sound again. You may press the Alarm-Mute button again or return the sash to its proper operational height.
2. If the viewscreen sash alarm is still activated when in the proper location, disconnect the power supply, open the front dress panel and check to see if the proximity sensor cables are connected.
3. Check to see if the viewscreen proximity sensor is properly aligned and is sensing the top leading edge of the viewscreen. (Stainless steel channel must be in place on top edge of viewscreen)

If one (or both) of the electrical outlets does not function-

1. Make sure the outlet switch is in the on position. The blue indicator above the button should be lit.
2. (For 115V cabinets only) Check the reset button on the ground fault circuit Interrupter (GFCI) outlet located on the left hand sidewall of the cabinet. If the GFCI has tripped, a red LED on the outlet will indicate this condition. Press the reset button to reset outlet. The outlets are also protected by a self-resetting thermal circuit breaker. A qualified electrician or cabinet certifier, using the wiring diagram in the appendix of this manual, can check this breaker and all other connections/components in the circuit.

If the Ultraviolet (UV) light doesn't work-

1. Make sure the viewscreen is completely closed. The work area light should turn off automatically.
 2. The yellow indicator above the switch should be on.
 3. If UV light is still inoperative, disconnect the electrical power supply, open the front dress panel and check for proper installation of the UV bulb in the lamp sockets.
 4. Inspect the UV bulb; replace if necessary. For replacement instructions see page **Error!**
- Bookmark not defined..**
5. Have a qualified electrician check the wiring to ensure that proper voltage is supplied to the ballast.
 6. If none of the above corrects the problem, the UV ballast may need replacing.

When a smoke test indicates that there is air flowing from the interior of your cabinet into the surrounding room-

1. Cabinet shall be certified by an experienced cabinet certifier at least annually to verify cabinet performance.
2. Make sure that the building exhaust is operating at the required static pressure and exhaust flow stated in this manual or the cabinet data plate. The cabinet airflow monitor alarm should indicate a low airflow condition if the flow is not at a safe level.
3. Check to see if anything is blocking part of the work surface front or rear perforation. Also check under the work surface to see if anything is blocking the exhaust filters.
4. Verify that cabinet down flow is within specification.
5. Check for room cross drafts caused by vents, open windows, and high traffic through doorways. Eliminate the source of the cross draft as this could cause airflow to escape from the cabinet work area.

6. The exhaust filter may be loaded with particulate if the cabinet has been in service for some time. Decontaminate the cabinet and replace the filters.

When there is uneven fan operation, or noise from the motor/blower assembly-

1. Disconnect the power supply, open the front dress panel and inspect the motor/blower assembly for obstructions, loose or broken mounting hardware. Remove, tighten or replace as required.
2. Check the speed controller for proper input power and contact The Baker Company technical support group for assistance.

Main Circuit Board Troubleshooting

A troubleshooting guide for the control board: drawing 503E505 is provided.

Warranty

The Baker Company, Inc., expressly represents and warrants all goods (a) to be as specified (and described) in The Baker Company catalogues and literature, and (b) to be free under normal use, service and testing (all as described in The Baker Company, Inc., catalogues and literature) from defects in material and workmanship from a period of seventy-two (72) months from the invoice date [US/Canada only] and Twelve (12) month warranty for international.

The exclusive remedy for any breach or violation of this warranty is as follows: The Baker Company, Inc., will F.O.B. Sanford, Maine, furnish without charge repairs to or replacement parts or equipment which proved defective in material or workmanship. No claim may be made for any incidental or consequential damages.

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P. O. Drawer E / 161 Gatehouse Road / Sanford, Maine 04073 / USA
800-992-2537 / 207-324-8773 / Fax: 207-324-3869 / bakerco@bakerco.com / bakerco.com



The Baker Company, Inc.
175 Gatehouse Rd.
Sanford, Maine 04073
Tel: (207) 324-8773 / (800) 992-2537
Fax: (207) 324-3869
Email: bakerco@bakerco.com
www.bakerco.com